THE IRON TRADE REVIEW

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THE IRON TRADE REVIEW.

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THE WEEK IN IRON CIRCLES.

General Features.

In the two important matters of crop prospects and the money situation, the outlook is plainly better than a week ago. The rains have been general, though moderate, and fears of drought are over. Money continues close, but not uncomfortably so, and prospects point to greater ease in the Summer. Several car works have secured additional contracts, and are increasing their work. There has been more inquiry for iron from this source than for many months past. In the case of iron pipe, which figures very largely in the consumption of Southern coke iron, there is a better demand, but still below the normal. The difficulty of placing municipal and waterworks bonds operates to restrict new enterprises. The same cause effects new undertakings in general, so far as they depend on the placing of securities. At Louisville, the inquiry continues fair and pretty well distributed over different sections. Many buyers realizing that prices have touched bottom have supplied themselves for several months to come, while others continue to purchase small amounts believing that while prices may be low there is small chance of an immediate advance and are willing to take their chances of picking up odd lots at prices a little under line. Furnaces are beginning to feel that it is time they should do something to better the situation if it is possible, and an effort is being made to bring about an established basis of prices from which none will recede, and as this sentiment seems to prevail pretty generally it is believed that the movement will be fairly successful. Nos. 1 and 2 foundry are reported scarce. The price is nominally $10.25 for grey forge, Birmingham, though iron can be bought at $10, and a round lot of No. 2 soft has just been placed by one of the leading companies, basis of $10.25, Birmingham, though recently contracts were taken as low as $10, Birmingham. The heavy buying in Chicago district is beginning to drop off somewhat, many of the leading concerns having covered their requirements running over a period of from six to twelve months ahead. Notwithstanding this, the past week showed some heavy sales of local coke irons, these being to a large extent on behalf of the agricultural implement makers. Good-sized inquiries continue to come in covering both large and small sized lots, for deliveries well scattered ahead. The leading brands of Lake Superior charcoal are now being held quite firmly at $18.00, Chicago, and many buyers are covering their requirements on this basis. On Southern coke irons prices are also firmer. Furnaces of the Chicago district are indisposed to book contracts for long scattered deliveries, believing that better figures will rule later in the Summer than those now going. At Cincinnati, the buying inclination has steadily increased the past week. Large orders have been placed, and buyers have been willing to pay an advance of 25c. per ton, and in some cases more, to secure deliveries through to the end of the year. This applies to Southern iron. In Northern brands, particularly those made from lake ores, prices for the late deliveries are no higher than for early shipments, and in some cases are lower. This is especially the case with Bessemer irons. There is, however, good ground for this apparent disparity. Prices of Southern coke irons are relatively lower than are those of Northern brands, and are down close to cost basis, which cannot be further reduced. The slightly better outlook noted in our last review as visible at Detroit, has been realized to a certain extent, both in quantity of sales and also in figures, though the variation in the latter has been very small. The settlement of the coke strike has had no appreciable effect on the quotations of either Northern or Southern irons, although a sale of Bessemer (1,000 tons) was made at a trifle under $17 cash, where a week ago no one was willing to book orders. Lake Superior charcoal is moving actively in all directions, the buyers who have not already covered realizing that the present range of prices cannot last very much longer. In all branches of iron business, locally, the report of general steady improvement is heard. There is more general activity displayed in the Buffalo market than at any time before this year. Although but few large blocks are being placed, still the aggregate amount distributed over a large territory is quite considerable. There are no signs of largely increasing consumption, but the demand is due to the reduced stocks in consumers' yards, on which up to this time they have been depending. Although there has been no advance in prices, the tone of the market is decidedly stronger. Both producer and consumer being short on stocks, the position of the former is manifestly one of strength.

The Local Situation.

Since the floodgates of sales in the iron line opened, there has been no cessation of activity, and no interruption has occurred in the steady outgo of ore, of all kinds, and at all prices, to suit the purchasers. It may be authoritatively stated that Mr. Carnegie has "loaded up" to the extent of about twelve hundred thousand tons, about a million of which is of Bessemer grade. It is currently reported that of this million tons of Bessemer ore the list includes 300,000 tons of Minnesota, of a dozen kinds and as many prices, 250,000 tons of Norrie, which for this occasion is said to have been considerably shaded under the opening price which was $4.50; 200,000 tons of Chandler, at $4.25; 75,000 tons of Champion, at $5.50; 50,000 tons of Cliffs Shaft, at $4.25, and 50,000 tons of Salisbury, at $4 15, along with some other ores not definitely stated. The non-Bessemer sales for the same consumer are said to include 100,000 tons of Lake Superior No. 1, at $4.50. Among other sales reported for the Pittsburgh market are some Lake Angeline ores, of all the grades, and some Pewabic ore. The producers, it seems, were fairly stumbling over each other in attempts to dispose of their output, and any price they could get for it. In the meantime there are lying in this harbor some thirty-five ore-laden vessels that cannot discharge their cargoes because of the strike of the dock laborers, and the prospect points to the necessity of drastic means to release these craft from embargo. The vessel owners are determined to carry their point, and will apply to the State for protection if they are further debarred from carrying on their business. This is certain, however, that no more ore can possibly be brought down this season than will run the furnaces until Spring. Along in September may be expected the annually recurring car famine, and the furnacemen, anticipating this difficulty, are now making room for as much ore as they can find room for. The furnaces have either gone back into blast, or else are preparing to do so, and most of them have a good deal of work on hand, although the prices are lower than ever. Bessemer, for spot delivery, will net the furnaces, after deducting commissions, about fifteen dollars, which is hardly cost. On the other hand, those consumers who are still out of the market in the expectation that the resumption of work will soon produce a glut in pig iron, are liable to burn their fingers, since the furnaces have already on hand orders that will keep them busy no less than sixty, and, some of them, ninety days. It follows that the consumers who may want to squeeze in an extra order, here and there, will have to pay for their delay. The trade in manufactured iron keeps up, and there is an appreciable increase in demand, anticipatory to the annual shut-down of the mills for repairs, so that business in all these lines may be said to be rather brisk. Prices are not keeping step with this activity, however, and there has been no improvement in that respect.

THE TREND OF LAKE COMMERCE.

Truth and compliment are so closely blended, in the following editorial paragraph in the Duluth *Herald*, that we find it difficult to print the one without including the other:

The Cleveland *Iron Trade Review* gives a sharp lecture to the people of that city because they are not alert to the needs of commerce. It does not beat around the bush, but says in the plainest language that Astabula and other Lake Erie ports are taking away Cleveland's vessel business because it costs from 20 to 30 per cent. more to handle ore and other freights on Cleveland docks, while the transportation rates to and from lake and interior points are the same to the other Lake Erie ports as to Cleveland. The *Review* wants the rich people of Cleveland to awake and put in improvements in the shape of docks and apparatus for the rapid handling of ore and coal. A paper that can openly recognize the situation in so unpopular a way as has the *Review*, deserves as it already possesses, the respect of all the interests represented on the great lakes.

Apropos of the above, we find an interesting interview with ex-Mayor B. D. Babcock in the Cleveland *Leader*, of recent date, from which we take the following:

"They talk about the lack of storage capacity here, when there is room for more than a million tons of ore on the Cleveland & Pittsburgh and N. Y., P. & O. docks. Why are our docks crowded at the present time? Because it costs us more in wages to handle the ore and get it out of the way than is the case in other ports. During January, February and March, this year, of the 1,186,000 tons of ore shipped from the ore docks of Lake Erie ports, only 200,000 tons went from Cleveland. That tells the story; they could do it cheaper than we could. That is why our docks are kept full of ore. The Cleveland & Pittsburgh docks have a capacity of 600,000 tons, and they now contain 350,000 tons. The N. Y., P & O. docks have a capacity of 600,000 tons, and they now contain 400,000 tons. They say we have no capacity; why, last Fall they brought the ore here and crowded our docks because there was no room for it anywhere e'se. The figures I named a minute ago about the shipments made this Winter shows that the other Lake Erie ports have got rid of much of their ore and that their docks are in condition for the Spring business. Then look at the piles of ore lying here, because we can't compete in the cost of moving it It seems to me there is a solid reason in this state of affairs for Cleveland's falling off in the ore business. Now we are trying to do all we can to remedy the trouble We propose, hereafter, to pay only one cent an hour more to ore handlers here than the price paid at Erie, Ashtabula and Fairport. That has necessitated the reduction which has caused the present strike, or refusal of our ore handlers to work, necessitating the tying up of the ore laden boats when they come in. We are willing to pay one cent more than the other Lake Erie ports because th's port has superior natural advantages, and vessel men prefer to come here."

Cleveland ore handlers, Mr. Babcock said, are paid thirteen cents per ton, or three cents per ton more than those employed at Fairport, Ashtabula and Erie. Three cents per ton on iron ore, and twenty-five cents per day for general laboring work, which difference has also existed, amounts, on the quantity of iron ore and coal handled at the Lake Erie ports during an average season, to about $90,000. Mr. Babcock holds that this is the real reason why the other ports mentioned are able to take business away from Cleveland. The reduction of the wages of ore handlers recently decided upon brings the difference down to one cent per ton, which Cleveland is able to carry, owing to superior natural advantages.

The opinion above quoted coincides very closely with that expressed by *The Iron Trade Review* of May 14, but we think Mr. Babcock does not efficiently emphasize another point, viz.: our lack of handling facilities Storage capacity is all right so far as it goes, but improved handling machinery is a thing Cleveland docks wofully lack, and the lack is still more apparent when a comparison is instituted with such ports as Ashtabula, Fairport and Buffalo.

WHEAT AND IRON.

Here are some big figures in wheat that may interest iron manufacturers, in view of the close relations existing between the manufacturers and the iron market: The average wheat imports of the United Kingdom for the past five years have been about 148 million bushels; France, same time, about 44 millions. Great Britain will likely require 160 or perhaps 170 millions the coming year. French estimates are for a shortage of 130 or 140 millions of bushels, necessitating requirements equal to about 100 million bushels more than last season. Other consuming European countries are estimated to be short, while in none is there reported an increase. The European crop averages about 5,250,000 bushels, their rye crop about 1,100,000 bushels; both crops appear to be short about 10 per cent. Our exports the past month have been nearly ten million bushels, and since July 1st about 90 millions of bushels, against about 100 million bushels same time last season, and 80 millions for the previous season's eleven months' movement. Our consumption is 1,000,000 bushels per day.

All of which goes to show that there must be a heavy movement of wheat from this country abroad, and this outflow will be stimulated by the fact that nearly all importing European countries have taken off or reduced their duties on wheat, or contemplating so doing. Of course, it naturally follows that a large foreign demand for our breadstuffs will unmistakably help the railroads and, through them, the iron industries. At least, we hope so.

SAMPLE ENGLISH PROTECTION SENTIMENT.

English Protectionists, or Fair Traders, as they call themselves, are finding ample reason for encouragement, these days. As a consequence, they are bestirring themselves to renewed activity. Arrangements are being made for gratuitous distribution of hundreds of thousands of leaflets, etc. They have scored a hit by inducing the *Yorkshire Post*, a powerful daily newspaper published in Leeds, to open its columns to a letter controversy upon the merits and demerits of free trade, and all Yorkshire is following the discussion with keen interest. One aggressive fair trader undertakes to show "the difference between political economy with life, blood, bone and muscle in it, and that extracted from text books which, if applied to communities, produce convulsions as certainly as food which does not digest deranges the stomach and throws the system out of gear."

And, as if to punctuate the disheartening outlook for Free Trade, the Sheffield *Daily Telegraph*, an influential provincial newspaper, gloomily predicts the ruin of the Welsh trade, and expects workingmen in a few years will have a choice only of emigration, starvation or the poorhouse, unless Americans be fought "with their own weapons."

We have heretofore called attention to the practice of Sheffield cutlery makers, exposed by English trade papers, of placing the Sheffield brands on German-made goods, but the *Daily Telegraph*, above quoted from, has discovered that some British ship-owners, "in order to avoid Board of Trade regulations in regard to over-trading are in the habit of sailing their vessels under a foreign flag, while the fetish misnamed Free Trade precludes retaliation, for the purpose of protecting British shipping interests from insidious attacks."

Verily, the theory of Cobden is being sorely wounded in the house of its friends.

VIRGINIA'S WISE INDUSTRIAL POLICY.

Mr. E. C. Pechin, formerly editorial contributor to *The Iron Trade Review*, writes the following timely article for the *Iron Belt*, of Salem, Va. It brings out an important point that many towns would do well to consider:

It was a necessity that a given number of blast furnaces should be erected in Virginia to supply raw iron, but it is a safe business proposition that not another dollar should be put into a coke furnace anywhere along the Norfolk & Western Railroad or the Chesapeake & Ohio Railway for some time to come. A local supply of pig iron being assured, a furnace in itself is of no special benefit to a community from a business standpoint. It employs very few high-priced men, and in the total with modern appliances, a relatively small force, only distributing a small amount of money monthly. The coke as a rule comes from a distance. The mines supplying it with ore, employ men at ordinary day wages, and not very many at that. The wages they earn are necessary for the actual necessaries of life. The traffic to a railroad is large, but has to be carried at the lowest rates to be carried at all. With the severe competition in the iron market and which is likely to continue, the net profits are small, and very frequently these profits go to owners at a distance. Natural resources are exhausted without any commensurate return.

It is estimated that if all the furnaces now built and building were in operation that the coke iron output would be nearly 600,000 tons. How much of this is used at home? Very little. The great bulk of this make is shipped away to be worked up into finished forms elsewhere, by skilled workmen who get large wages.

It is impossible to build and successfully run a large modern furnace with a smaller capital say than $400,000. Now put this amount into a rolling mill, or foundries, or any industrial works using iron, and what would be the result? Instead of mere laboring men, at low wages many of them single, possibly living in shacks and boarding themselves and when getting a little money ahead, dropping their job and tramping from place to place, we would have skilled workmen, making full wages, with their wives and children with them, living comfortably and well, in time owning their own homes, bringing in their train carpenters and masons and grocers, merchants, tailors, and bootmakers and preachers, doctors and lawyers, and the building up of a prosperous community. A furnace of itself never builds a town—good mills must. The skilled wage-earner is the foundation upon which all must be built.

Virginia is acting wisely. Happily, we hear little of new furnaces, but a good deal of mills and foundries, shops and finished products for the wide markets, to be made out of her domestic irons and thus keeping and distributing right at home the resultant profit.

Shenandoah is building a rolling mill alongside of her furnace; so are Buena Vista, Roanoke, Pulaski, Max Meadows and Richlands. Radford has a large stove foundry actively at work and others are being built at Glasgow and Wytheville. Radford is leading off with a gigantic pipe works which Lynchburgh already has. Industrial works of various kinds are now locating among us and true policy demands that enterprises of every sort, working wood, iron and steel, must be attracted hitherwards. The business men of

each locality must band together to offer proper inducements to responsible manufacturers to settle with them, and particularly those who will use Virginia's admirable coke and charcoal irons.

United and judicious effort will bring the golden day when our fertile and lovely valleys will be dotted over with busy, bustling prosperous towns, such as everywhere strike and gladden the traveler's eye in the Northern and Western manufacturing States. Then it will be necessary to open mines and build more furnaces to meet the constant and ever increasing demands of a home market.

ESTIMATES OF THE COST OF A BASIC STEEL PLANT.

Mr. G. L. Luetscher, chemist of the Tennessee Coal, Iron & Railroad Co., makes some estimates regarding the possibilities of a basic open-hearth steel plant at Ensley, Ala. He states that the only raw material available, and practically inexhaustible is the Red Mountain ore, especially the hard ore. The average composition made from Ensley furnaces, pig iron would be about 2.75 to 3 per cent. silicon, 0.055 to 0.060 sulphur.

Attempts have been made to reduce the amount of silicon, without great success. The only means of doing this to some small extent is to crush the hard ore finer, mix it thoroughly to make it more uniform and add some lime to it. The finer shape will permit more "gas" reduction instead of "direct coke" reduction; the greater uniformity will permit the addition of lime without danger of "liming up" the furnaces. The four furnaces at Ensley can, when properly managed, produce 120 tons of pig iron per day per furnace. The blast furnaces could be run so as to be tapped at regular alternating intervals to furnish 30 tons of fluid pig iron every 90 minutes in three 10-ton or four seven and one-half-ton ladles. The saving in avoiding the pig iron to be cast into pigs and all the further handling, including expenses of selling, etc., would probably amount to 65 to 70 cents per ton (as 3 per cent. of scraps would also be avoided). The furnace could thus furnish fluid pig iron at a minimum price.

It is evident from the average composition of the pig, that such iron is not directly fit to be used in a basic open-hearth steel furnace, the only place, though, where its medium phosphorus contents will permit its conversion into steel. Its high silicon would corrode every basic lining at once. The silicon must therefore be first removed in an acid Bessemer converter.

Mr. Luetscher further predicts that it will never be possible to make basic pig iron direct from any Red Mountain ore, because the ore contains only one-third per cent. of manganese and too much silica. There are four possibilities to make steel out of Ensley pig iron, namely to:

1. Desilicize metal, bought as pigs, cast it into chills and make steel out of chilled blown metal.
2. Desilicize metal, bought as pigs, and pour the blown metal fluid into the steel furnaces.
3. Desilicize metal, bought in fluid state, cast it into chills and make steel out of chilled blown metal.
4. Desilicize metal, bought in fluid state and pour the blown metal fluid into the steel furnace.

Mr. Luetscher describes process No. 4, which he says is the ideal one.

Every 90 minutes an engine will bring three ten-ton or four seven-ton ladles of metal, which must be absolutely free from blast furnace slag, and accompanied by a small fracture test cast into sand (or into a chill) to give an idea of the silicon and sulphur contents for each ladle. One ladle is emptied into the Bessemer converter and blown for such a time as is required to remove nearly all or all of the silicon, some or most of the carbon. The sulphur will stay the same, the manganese will all be oxidized, go into the slag with considerable iron, besides, some iron will be partially lost as scrap. About 10 per cent. will cover the loss here.

The "blown metal" is poured into a ladle, mounted on a truck—drawn by a locomotive. As soon as the converter is emptied, the next ladle of pig iron is poured into it and treated the same way, and so on. Pig iron can be kept to stay liquid four or even more hours easily. The ladle which brings it will be weighed full and when going back empty, and the difference credited to the blast furnaces as pig iron. Should there be not sufficient supply of pig iron, in liquid state, two cupolas will melt pigs. Should there be more iron furnished than used at the open-hearth, it can be poured into chills in an adjoining cast shed, and stored for further use at the open-hearth. Mottled or white pig iron may be best treated in this manner all the time, to insure uniform distribution of the sulphur. Sundays or during stoppages of the Bessemer plant, the furnaces would cast as usual.

The "blow metal" will be brought to the charging doors of the open-hearths, five to six in number, two converter charges of 10-ton converters, or three of seven tons, poured in at the necessary time, will make a 20-ton heat of steel. By using liquid blown metal five to six heats, by using chill blown metal three heats of steel could be made in 24 hours.

The 10 per cent. loss at the converters would partially be regained by ore or scrap additions.

The ore for decarbonizing would have to be picked brown ore, with as little silica as possible, or other suitable ore. Limestone of sufficient purity is easily obtained in the district referred to. The open-hearths have magnesia bottoms and sides, silica roofs and the rest as usual. The finished steel is poured into a ladle, mounted on a crane truck, drawn by locomotive to the casting pit, poured into ingots of about two tons each, and these are charged into heating furnaces, as hot as possible, rolled into blooms, billets and slabs at the blooming mills. Eventually, the ingots can be rolled in a plate mill into ship plates, fire-box and boiler steel, etc.

Mr. Luetscher would start with one converter, one cupola, four open-hearths and three heating furnaces, leaving space and building with a view to add one converter, one cupola, two open-hearths and one or more heating furnaces. Following is his estimated cost of the process, taking 16 men per turn for liquid pig metal, and 22 men per turn for solid pig metal:

500 tons liquid pig iron at $10	$5,000
Converting into blown metal, labor 24 hours	70
Steam	23
Repairs, interest, etc	85
450 tons blown metal, liquid	$5,175

When made from liquid pig:

One ton blown liquid metal	$ 11.50
One ton blown solid metal	11.70
500 tons solid pig iron at $10.75	5,375 00
Converting into blown metal, labor 24 hours	92.00
Steam	20.00
Repairs, interest, etc	85.00
Coke, 60 tons	150.00
450 tons blown metal	$5,745.20

When blown from solid pig:

One ton blown metal, liquid	$12.75
One ton blown metal, solid	22.95

Twenty cents additional per ton will cover the pouring into chills, stocking, etc.

The cost of making steel out of blown metal he estimates will be $7 (or less), including labor, repairs, materials, etc., from one ton of blown metal to one ton of steel ingots, when the metal is used in liquid state.

The cost per ton of steel ingots will be—

1. Liquid pig iron, liquid blown metal	$18 50
2. Liquid pig iron, solid blown metal	19 70
3. Solid pig iron, liquid blown metal	19 75
4. Solid pig iron, solid blown metal	20 95

The cost of blooming will be $2 per ton. The total cost of plant he estimates as follows:

	To start with.	completed.
Bessemer department	$ 90,000	$100 000
Open-hearth department	200,000	280,000
Blooming mill	105,000	120,000
General buildings	35,000	44.000
Plans and superintendence	15,000	16,000
	$445,000	$500,000

Working capital $200,000 to $240,000 as a minimum. To calculate the profits, assuming 450 tons of steel billets would be produced by completely direct process (liquid pig and liquid blown metal), the pig to cost $10 per ton, the self-cost to be $21 per ton, the market price to be $26—the profits, Mr. Luetscher estimates, would amount for 250 working days to about $2,000 per day or $500,000 per annum, half of which sum would already be quite a fair gain on $800,000 to $1,000,000 investment. The product, he holds, would be fit to be manufactured into cotton ties, barrel hoops, tin plates for canning, tubes and pipes, wire rods for telegraph and fence wire for specific Southern markets.

For steel castings and tool steel the scrap of the steel works could be remelted in an acid open-hearth furnace; one of the six furnaces could be built for the purpose. Besides any contents of carbon can now be obtained for basic steel by the Darby process.

The question, which may be brought up by misunderstandings, where the necessary "scrap would come from for making steel," may be answered by the assertion that no scrap is necessary at all for this continuous process, as the low carbon metal will be obtained at will by longer blowing of the metal in the converter. The scrap of the works themselves, like crop ends and shear scrap from plates, will always find use in the furnaces again.—[Tradesman.

Concrete and Iron Beams.

An account of some recent tests of floor beams constructed of cement and iron is given in *Engineering*, of London. The beams experimented on were constructed of Portland cement mixed with coke with a number of round iron rods imbeded in the cement so as to assist the beam in taking the tensile stresses arising on loading. These beams are more especially intended for floor joists, but the inventor always proposes to use them as railway sleepers. In order to allow of the floor planks being nailed to the joists, a tongue of soft concrete, consisting of one part cement to four of fine coke breeze, is inserted to take the nails, which can be driven into it as easily as into wood, and have considerable holding power. The mass of the beam is composed of equal parts of Portland cement and breeze. In the specimens tested at the age of 21 days the breeze had been passed through a ¼-inch mesh, whilst for the seven-day beam the mesh was ½-inch. The experiments proved conclusively that the insertion of the iron rods, which were round and smooth, just as received from the rolls, considerably increased the strength of the cement beams. The average breaking load of the two concrete and iron beams tested was about 2,500 pounds, whilst an exactly similar beam, save that the iron rods were omitted, broke off short like a carrot under a load of but 431 pounds. The adhesion of the concrete to the iron seemed very good, as in no case did the rods draw out of their beds, though in certain instances the beams finally failed by horizontal shearing through the concrete along the line of the rods.

Sheets or Plates?

A curious perversity exists among those who use plates and sheets. A boiler maker almost invariably calls his plates sheets, while those who handle thin sheets cut in very small sizes call them plates. The custom of calling a plate sheet is of very long standing in the boiler making trade, but appears to be only a shop term, as the boiler makers invariably call a plate by its proper name when sending an order to the manufacturer. The habit of calling a sheet a plate obtains particularly among those who make tin plate. The sheets used in making tin plate are mainly from 28 to 30 gauge and are clearly thin sheets, yet by trade they are called "black plates." They are rolled in a sheet mill and by a sheet roller, but are not known as sheets by those who handle them. The finished product is not really tinplate but tinned sheets. This mixing of technical nomenclature can hardly be reformed, but will probably endure permanently as an example of the perversity of human nature which leads us to prefer the opposite of what we have.—[Iron Age.

AMERICAN INSTITUTE OF MINING ENGINEERS.

For the second time since its organization, in 1871, the American Institute of Mining Engineers held a meeting in Cleveland. It was the fifty-ninth assembly, and was in session from June 2d to 5th, at the Stillman. The meeting opened with an address of welcome by Mayor W. G. Rose, to which President Birkinbine responded. Then followed "Engineering in Egypt," by R. W. Raymond. At the next session there was an interesting discussion on electric welding. Some of the papers that were expected to have been read were not, but the sessions proved most interesting, and the programme was followed as closely as possible. J. C. Smock, of New Jersey, gave a summary of a paper on iron mining in New Jersey. "The Development of American Blast Furnaces," by James Gayley, was discussed at some length. Alexander Brown was called upon to tell something about the handling of ore and fuel by machinery. "About 1880," said Mr. Brown, "the increasing output of the mines began to be felt, and it became evident that something must be done to facilitate the handling and storing of the ore. This meant three things: First, a vessel tonnage adequate to the output; second, facilities for loading the vessels; and third, facilities for unloading them without delay. The original designs for loading the boats at the upper lake ports were so good as to require scarcely any change, but it was different at this end of the lake route. In 1880, nine-tenths of the ore was taken out of the vessels by horse or steam power in small buckets and wheeled to the ore piles. The wheelers called themselves experts, and would allow no interference with their work. They even objected to the ore being hoisted by steam power, and the first engines put on the docks were thrown into the ships. They soon found out, however, that the use of steam instead of horses didn't take away their power as skilled wheelers, and allowed the engines to be used. Either the miners had to regulate their output by the amount of skilled muscle at this end of the lakes or something else had to be done."

"The First Iron Blast Furnaces in America," by W. H. Adams, of New York, was a very interesting paper. "In the chain of historic evidence," said the speaker in conclusion, "which secures to Virginia the credit of establishing the first bloomery in the year 1619, and records for her an almost unbroken line of successes in charcoal furnace practice since the Revolutionary War, there has been hitherto (by reason of the unfortunate destruction of documents) one missing link, namely, the proof of the extensive pioneer work done by the Spotswood furnaces from 1714 to 1730. This paper describes how I have sought to recover that link, establishing beyond doubt, by careful tracings along the mineral belt from the South Anna to the Rappahannock, the sites of the first and second furnaces located and worked by the German Palatines and their successors. It is clear that this colony was settled at Germanna to open the mines and prepare for the active work of the furnaces; that materials of various kinds, which we now find on the ground, were brought from abroad for the construction of the first furnace at Rappahannock, and for the second furnace at Fredericksville; and that we have here the first pig iron ever smelted in America from the ore, in a furnace in which forced blast was used."

"Sampling Ores Without Use of Machinery," by Wm. Glenn, of Baltimore, was a short but instructive one. In the course of it he said: "Begin by shoveling the pile (ore which is to be sampled) roughly into the form of a flattened cone or flattened pyramid. Say we choose the pyramid. Now make a trench straight through the pile, cutting it into two nearly equal parts, and again by a trench (at nearly right angles to the first) divide these halves into four nearly equal quarters. A part of the ore taken from these trenches will form the sample required as follows: Having the wheelbarrow ready begin at the middle of any side of the made-up pile and cut the first trench. Cast the first shovelful to the right, the second to the left, the third into the wheelbarrow. Repeat this order until the barrow is full, then empty it upon the well-swept floor intended to receive the sample. Continue in the same way until the trench has passed through the pile, when there will result two rather long and narrow piles. Begin the second trench, extending it across the middle of the two piles, casting the first shovelful right, the other left, the next into the barrow. Proceed the same as with first trench. When done you will have shoveled about 600 pounds of ore. As every third shovelful was thrown into the barrow, there will result about 2 000 pounds of sample on floor. That this is a fair sample of the original pile is based upon the assumption that each third shovelful thrown into the barrow was like the first and second cast aside. The hypothesis is reasonable and freely to be trusted. Having sample, proceed with it after the regulation method."

"The Precipitation of Metals from Hyposulphite Solutions," by C. A. Stetefeldt, of San Francisco, was another valuable paper. "Metallurgical processes," said Mr. Stetefeldt, "cannot be conducted successfully without the aid of analytical chemistry. The great perfection of lead-smelting in the West, for instance, has only been accomplished by the analysis of ores, fluxes, slags and all products of the furnace. Ores are mixed and fluxed to obtain a slag of desired composition. Account is even taken of the composition of the ashes obtained from the coke. The 'muscular' smelter has left the field forever! This state of affairs has been induced by sharp competition, *i. e.*, by a complete separation of the industries of mining and reducing ores, not by the liberality and wisdom of directors and stockholders to provide laboratories and engage chemists, or by their love for scientific investigation."

"The Alluvial Tin Deposits of Siak, Sumatra," by Chas. M. Rolker, of New York, began as follows: "The main tin-producing regions of the world are known to be England, Australia and the Dutch East Indian possessions, chiefly Banca and Billiton. During recent years, the tin of the Malay Peninsula, exported from Penang and Singapore, has been coming prominently to the front. France, Austria, Hungary, Germany, Spain, South America, Russia and China still present significant figures. The conspicuous part which the Dutch possessions in the Indian Archipelago have taken in supplying the world with tin, is well known. Tin was discovered in Banca as early as 1710, and has been produced there ever since; but the supply has been most important since Banca became fully into possession of Holland, in 1821."

"Experiments with the Imperatori Process at Croton Magnetic Mine, New York," was read by J. B. Nau, of New York, and "The Refining of Sulphides Obtained in the Lixivitation Process with Hyposulphite Solutions," by C. A. Stetefeldt, were read, but owing to the fact that the time of going to press does not permit it, no mention of the subject matter can be made in this issue.

WORLD'S FAIR APPROPRIATIONS IN 1876 AND 1893.

The several States of the Union, as a rule, are making much larger appropriations for their representation at the World's Columbian Exposition of 1893 than they did for the same purpose at the Philadelphia Centennial of 1876. The table of appropriations made, which is given below, shows this very clearly. For sake of comparison Pennsylvania and Illinois, the States holding the expositions, are placed together at the bottom, and Illinois is made to figure for $1,000,000 in 1893, it being certain that it will vote for that amount.

STATE APPROPRIATIONS

States.	1876.	1893.
Arizona	$ 5,000	$ 30,000
Colorado	10,000	100 000
Connecticut	25,000	25 000
Indiana	5,000	75,000
Iowa	20,000	50,000
Maine	10 000	40,000
Massachusetts	50,000	75,000
Minnesota	500	50,000
Montana	5,000	50,000
New Hampshire	16,500	25,000
New Jersey	24 000	20,000
Ohio	45,500	100,000
West Virginia	20,000	40,000
Wisconsin	22,000	65,000
Total	$258,500	$ 45,000
Arkansas	$ 15,000	Appropriations defeated by Arkansas, Kansas, New York, Oregon and Rhode Island. Action not yet taken by others.
Delaware	2,000	
Kansas	10,000	
Kentucky	5,000	
Maryland	15,000	
Michigan	7 5'0	
Mississippi	5,000	
Nevada	20 000	
New York	33,000	
Oregon	4,000	
Rhode Island	7,500	
California	Appropriated nothing in 1876.	$ 300,000
Idaho		20 000
Missouri		150,000
Nebraska		50,000
New Mexico		25,000
North Carolina		25 000
North Dakota		25,000
Vermont		5,000
Washington		100,000
Wyoming		30,000
Pennsylvania	1,125,000	300,000
Illinois	10,000	1,000,000
Total	$1,517,000	$2,775,000

It will be noticed that only 27 States appropriated money for their representation at Philadelphia, and that the aggregate amount was only $1,517,000 Including Illinois with a million, which is certain, 26 States have already appropriated $2,775,000 for 1893. In case of the Centennial a number of the States did not make the bulk of their appropriations until a few month before the exhibition opened. Pennsylvania's appropriations, numbering six between May, 1871, and May, 1876, and aggregating $1,125,000, were not solely for that State's building and exhibit, as will be the case with Illinois in 1893. but were partly in general aid of the exhibition enterprise. The Centennial authorities solicited stock subscriptions from all parts of the country. Chicago has not gone outside its own city limits.

Besides the States and Territories named in the table above, there are twelve others, which were neither represented at the Centennial nor have yet voted appropriations for 1893. By the most conservative estimate the States will spend five or six times as much on their representation at Chicago as they did at Philadelphia.

The city of Philadelphia voted $1,500,000 in aid of the Centennial. The city of Chicago has appropriated $5 000,000 for the Chicago Fair. The United States Government spent $649 250 at Philadelphia, and loaned $1 500,000, which was repaid. It has voted to expend $1,500 000 on its exhibit at Chicago. These facts tend to show that the Government and the States appreciate that the World's Fair of 1893 will be a far greater exposition in every way than was the Centennial; as, indeed, it ought to be, considering the wonderful growth and development of the United States since 1876.

THE June *Century* has an interesting frontispiece portrait of George Mifflin Dallas, formerly Vice-president of the United States. This portrait accompanies the second and last installment of the papers extracted from Mr. Dallas' journal, written while he was American Minister to the Court of the Czar Nicholas I. General Sherman's last speech, delivered at the Press Club dinner to Henry M. Stanley, January 31, is for the first time printed in this number of the *Century* from manuscript dictated by General Sherman before the speech was made. This is accompanied by a picture from St Gaudens' bust from life of Sherman, and by a poem by R. W. Gilder. The new paper in the California series is by Dr. Charles B. Gillespie, of Freeport, Pa., and is substantially a transcript from his California journal of 1849 and '50, being a description of a Sunday in Coloma, in which the rougher life of the mines is most prominent—the auctioneering, racing, gambling, thimble-rigging, etc. Mr. and Mrs. Pennell have papers on "Play and Work in the Alps." The one on "Play" is written by Mrs. Pennell, and that on "Work" by her husband, both being picturesquely illustrated by him. In the series of American pictures a full page engraving by Closon is given of "Springtime," from a painting by Ernest L. Major. In "Topics of the Time" another popular financial study is given, entitled "Modern Cheap Money Panaceas." There are, also, editorials on "Judicial Control of Contested Election Cases" and "Law or Lynching."

AMONG THE IRON MINES.

Lake Superior Mining Notes:—

MARQUETTE RANGE.

They have struck ore in the west end of the upper level of the American, and it is said to be opening out finely. This is news those interested will be pleased to hear.—[Ishpeming Iron Ore.

Three drill holes have been bored at Quinnesec, to test the extent of a deposit of magnetic ore. The first cut about 70 feet of ore, the next two showed but little, and a fourth boring will now be made. It is thought that a paying vein of merchantable ore will be developed at this point, which, should it so prove, would be a good thing for the people of the village of Quinnesec. —[Ishpeming Iron Ore.

Mr. E. P. Foster, was a visitor to our city the other day. He reports that, while Iron Mountain is enjoying the usual quiet in the line of mining affairs, yet there is considerable being done with an eye to the future. The Hamilton is said to have made a very important addition to its stores of developed ore, although it will be some time yet before they can secure the benefit of it. The city is growing, new buildings springing up on every side, and indications point to a vast increase of population.—[Ishpeming Iron ore.

ATICOKAN RANGE.

W. W. Russell, the well-known civil engineer of Port Arthur, has been in town, says the Duluth *Herald*, in conference with Duluth people regarding the development of properties on the new iron range west of Port Arthur known as the Aticokan range. He informs the *Herald* that he has just returned from Ottawa, where he has been looking after an act petitioned for by a large number of people, which, if passed, will give the new range a railroad outlet. "I think," said Mr. Russell, "that the Dominion will pass the bill within three weeks by which a bonus of $3 200 per mile will be granted. Then we expect to get aid from the provincial government of Ontario in addition. Just how much I cannot say. This road will begin on the Canadian Pacific between Carlstadt and Bridge river. It will run thence 50 miles in a southwesterly direction. The ores on the various properties average 67½ per cent. metallic iron, while in some instances they have gone as high as 71. There is but a trace of phosphorus in the ores and practically no titanium. The freight situation is most favorable to the shipping of ores to Cleveland and pay a duty of 75 cents per ton. If the ores be smelted in Canada, the conditions are even more favorable, as there would be no duty to pay and the Dominion government would give a bonus of $2 per ton for all the pig iron manufactured. Two thousand dollars per mile could easily do the grading for four-fifths of the distance. The balance needs only a medium amount of work. Ten thousand dollars per mile would put the track ready for use." Mr. Russell reports that diamond drills are about to be used on some of the properties.

MENOMINEE RANGE.

Things are booming at the Commonwealth Co.'s new find, and at the rate they are moving it will take but a short time to finish the stripping. One of the working shafts is sinking fast, little or no trouble having been experienced with quicksand or water. Drifting is progressing toward this shaft from the bottom of No. 1 exploring shaft, at a distance of 80 feet from the surface. The other shaft is in quicksand, and progress is necessarily slow, but after the ledge is reached the work of sinking can be carried on more rapidly. A gang of men are at work grading a wagon road to the new find. A steam hoist will be put in to sink No. 1 working shaft. The railroad company's engineers have been in Commonwealth several days this week setting grade stakes, etc., and Contractor Anderson, of Iron Mountain, now at work upon the spur of the new mine, has several thousand feet of the right of way cut out, and has a gang of men at work near the new mine.—[Florence Mining News.

The Dunn mine is "in it," as the saying is, and one to watch the work going on there would date himself back to the Summer of 1890, instead of the "awful dull year of 1891" During the past week the daily shipment has been 1,000 tons, yesterday 1,200 tons were sent out; of this 800 tons per day were raised, and the remainder taken from the stock dock, which started in with better than 40,000 tons. The mine is 380 feet deep at No. 3 shaft, the work of the past Winter opening up new underground territory considerable in extent. At the south end of the mine is a large open cut down to the ore, being the ceiling of rooms previously worked out, an immense block of ore is shown which is milled to the first level and taken to the surface through No. 1 shaft. No. 2 shaft, which is in the stripping, is out of use; with the great gain made by the new 10-foot drums two openings are sufficient to remove the product of the mine as fast as wanted. There seems to be no question but that the '91 output of the Dunn will equal that of 1890.—[Iron Range, Iron Mountain, May 28.

At C shaft of the Ludington the sinking is being carried on below 13th level As soon as the 14th level is reached a drift will be extended through the ore body to the hanging wall, and then make connections with A shaft. The management hope to make connections and to be hoisting ore from the big vein through C shaft during the present season. The underground work is going on nicely, and everything is in prime condition. At A shaft all the runners in the shaft have been taken out, and the new skip-roads are being put in as rapidly as possible, about 350 feet being now completed. It is expected that by the time the new shaft-house is completed the roads will be finished, and hoisting from that shaft will be resumed with renewed vigor. The present decrease in the output of ore caused by the delay which followed the recent accident will be made up in a short time by the better hoisting facilities which will be provided in the erection of the new shaft-house.—[Iron Range, Iron Mountain.

For some time the body of ore at the Walpole mine has been lessening gradually until now it is almost lost sight of, and the mine is in a state of almost total inactivity, only four miners being employed underground. The shaft is about 400 feet deep, and for three years has been worked on a vein about 150 feet in length and varying in width. In the three years 16,000 tons was taken from the mine. Regarding the continuance of operations we are unable to state what the owners of the property will decide upon. The mine contains several hundred feet of cross-cuts and is in good shape for exploratory work, which will, no doubt, be started later in the season.—[Iron Range, Iron Mountain.

Lake Superior Shipments of Iron Ore:—

Lake shipments of iron ore from the mines of Lake Superior, for the season of 1891, up to Wednesday, May 13, are as shown by the appended statement:

MARQUETTE RANGE.				
Champion		2,062	Lake Superior	3,983
Total Marquette Range				6,045
MENOMINEE RANGE.				
Ludington				10,801
GOGEBIC RANGE.				
Aurora	4,187	Germania	1,763	Pabst 12,846
East Norrie	5,190	Mt Hope	1,556	Palms 2,120
Father Hennepin	4,476	Norrie	13,916	West Cary 5,080
Total Gogebic Range				51,149
Grand totals				67 995

Alabama's Future in Iron and Steel.

The future of the iron and steel industry of Alabama was a subject very fully considered in a paper read at the recent Anniston meeting of the Alabama Industrial and Scientific Society. The author, Mr. B F Peacock, superintendent of the forge department of the United States Rolling Stock Co.'s plant at Anniston, held that, while its matchless resources of mine and forest, coupled with its transportation facilities by rail, made it easy for Alabama to compete, even in the world's market, in pig iron, bar iron or steel products, yet something more was needed before the State could take front rank in respect of the metallurgical industries. There should be a judicious improvment of all available waterways, and all raw materials should be manufactured at home into finished products worth as much as $300 a ton, instead of selling as now in unfinished form at $9 to $30 a ton. The natural resources and the requisite skilled labor were present to invite and urge such a change.

In regard to steel manufacture, Mr. Peacock thought that a great deal of the output of the blast furnaces would soon be used by the basic process, notwithstanding the narrow-minded policy of the owners of the patent. This, for the reason that there are other substitutes for the basic furnace linings, outside of the Steel Patent Co's. rights, that could be used to avoid the unreasonable payment of $1 per ton royalty. Touching the further objection that steel could not be made in the South for a long time by the improved basic process for lack of scrap, Mr. Peacock said the consumption of old material at the present time bears almost the same relation to the consumption of pig iron it did some years ago. This being true, there need be no alarm on the score of "no scrap."

The coming process for steel manufacture, however, is, to all appearances, the direct one. For many years he had thought the mater over, and always considered the direct production of iron and steel from the ore, without the intervention of the blast furnace and puddling furnace, as a possibility—in view of the fact that a direct process was practiced by the ancients, the Indians and the Romans.

There are two patents of prominence in the country already for the production of iron and steel by the direct process. The Adams is one of these, and has gone beyond the experimental stage. The elements of saving in the process covered by this patent seem two-fold, namely: the substitution of raw ore for pig metal, and the substitution of non-Bessemer for Bessemer stock.—[Age of Steel.

A Copper-Nickel Alloy Plant for Cleveland

We are in receipt of the following communication of general interest:

TO THE EDITOR OF THE IRON TRADE REVIEW:

If it is sufficiently interesting, you might announce that this company has purchased about thirteen acres of land, on the Valley Railway, near Brooklyn Station, on which it will immediately erect a copper-nickel alloy plant. Yours truly,

THE CANADIAN COPPER CO,
By H. P. McINTOSH, Sec'y-Treas.

CLEVELAND, O., June 2d, 1891.

We understand, in addition to the above, that work has already commenced on the new plant, which will consist of three or four buildings. The works are expected to be in active operation by the first of August. The fuel will consist of coal, coke and manufactured gas. We congratulate the company upon its wise choice of a location, and the citizens of Cleveland upon the addition of a new and important industry.

Scribner's Magazine for June, continues the notable series on "The Great Streets of the World" and "Ocean Steamships;" Francisque Sarcey being the author of the article on "The Boulevards of Paris," and William H. Rideing contributing the paper on "Safety on the Atlantic." The illustrations in both groups continue to be very rich, and appropriately supplement the text, adding to its significant and picturesqueness. Amateur photographers will find much to interest them in the article on "Some Photographs of Luminous Objects," with many illustrations reproduced directly from the negatives by mechanical processes. The fiction includes stories and sketches by F. J. Stimson, Bliss Perry, and Maria Blunt. There is also an essay on Moliere by Andrew Lang, with a striking portrait as the frontispiece of the number; and a calm, critical review on large lines, of some of the most significant features of the Civil War, viewed as illustrations of military science and strategy. The author, John C Ropes, is one of the closest students of military history in this country, and one most fitted to treat the subject free from personal prejudices.

LAMINATED STEEL PLATES.

In the February issue of the *Locomotive* we illustrated a laminated steel plate that came to our notice some time ago. At the time we first received the plate it was generally believed that steel was not liable to blister, since it is rolled directly from the ingot, and should, therefore, be entirely sound. Within a year or two, however, several instances have come to our notice, in which steel plates have been badly laminated. The cuts given in this issue illustrate two such cases.

Fig. 2 shows a plate that was cut out of a steel boiler that had been in use only six weeks. A blister developed on the lower side of the second fire sheet.

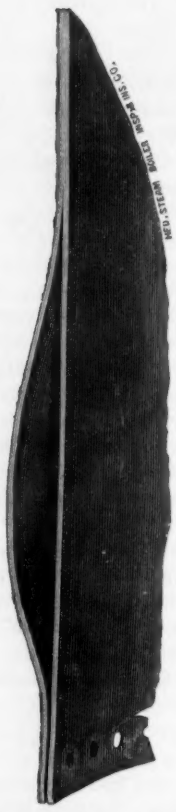


FIG. 1.—LAMINATED PLATE CUT FROM A STEEL BOILER.

FIG. 2.—LAMINATED STEEL PLATE.

It was raised about three inches at the highest point, and as nearly as could be judged by the eye it covered an area about 20 inches square. On cutting it out, however, it was found that the lamination extended in a thin line so as to separate the plates over an area about 30 inches wide and 36 inches long, the plate being so evenly separated as to closely resemble two plates, laid one upon the other. This appearance is represented in the cut. The outer layer, being exposed to the fire, had bulged over part of its extent, while the inner half showed no change in form and was free from any scale or deposit. The workmanship on the boiler is first-class in every respect, and the material was evidently intended to be, as the brand of one of the best mills in the country is stamped directly on the blister.

Some correspondence passed between this office and the makers of the plate. A few extracts from it are appended. "We are very sorry," writes the manufacturer, "to learn of the lamination having occurred. It is not the result of any attempt to weld the steel, as some people suppose, but in casting the steel ingots bubble or blow holes will be confined in the mass sometimes, and, of course, when the ingot is rolled out, the surfaces are flattened together, leaving what appears like a blister, sometimes large, sometimes small. In the earlier days of steel making we found frequent cases of this kind, but in recent years skill and experience have enabled the steel men to largely overcome it. We watch constantly for it, however, in examining and hammering our steel plates, but in this case the surfaces were evidently so closely in contact that the hammer did not detect any flaw, either with us or with the inspector at the boiler shop; and it did not show up until the heat separated the surfaces."

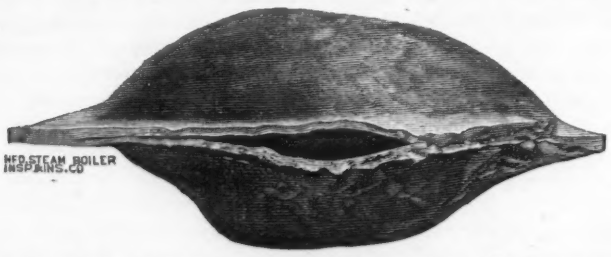


FIG. 3.—CURIOUS BLISTER FROM A STEEL (?) BOILER.

The pieces of plate was cut apart through the middle of the blister, as shown in Fig. 1, and one-half of it was sent to the maker for examination. He says: "The plate shows up very badly, and is certainly a very unusual specimen. In all our years of experience in the steel-plate business we have not seen its parallel; but we have seen defects of the same character, though much less extensive. It was caused, no doubt, by slag confined in the ingot. About nine years ago we bought some fire-box steel for our own use, from a reputable manufacturer who sells a great deal of material throughout the New England States. Five plates out of the lot had to be rejected on account of blisters, and yet they were sold as the best open-hearth fire-box steel. Such defects are likely to occur in the case of ingots poured from the top. It is now considered much better to pour from the bottom of the mold, through a pipe placed alongside and connected to the molds by underground channels. Our rolls are cast in the same way. The metal flows more freely, and without splashing, and any impurities contained in it will arise to the top more readily, and remain there." Again he says: "The case, we think, is the worst one that has ever escaped our hands; and we admit that to one unacquainted with the difficulties in the manufacture of steel ingots it has the appearance of an attempt to weld steel together. In any case of this kind, however, the weld would gradually weaken and not come to a definite termination. One could readily satisfy himself on this point by cutting off a portion and splitting it back to the end of the fold, and noting how suddenly the solid metal begins."

It is possible to leave too much of the top of the ingot, in cutting off the crop ends of the slabs intended for plates. If the plates are sheared too close to the edge of the plates as rolled, lamination may appear on the edge of the finished product. This does not seem sufficient, however, to explain such extensive internal separation as in the present specimen.

In Fig. 3 a very curious blister is shown. It occurred some time ago on a boiler that was supposed to be constructed of steel, though at the time, not having had any such experience, we had some doubts about it being steel. The singular feature about it is that it should have bulged so nearly equally in both directions. It has been suggested that a small fissure may have connected the original line of separation with the interior of the boiler, and that water penetrated the plate through this fissure, forcing the plates apart when it was afterwards turned into steam. This assumption looks reasonable, provided the fissure through which the water entered was very small, so that steam could not pass out of it rapidly. Very likely, if this explanation is correct, the blister was developed gradually, by the entrance of water every time the fires were drawn, and its subsequent evaporation when the fires were again started. In the original specimen numerous small blisters could be seen on the interior surfaces of the large one.—[The Locomotive.

THE COST OF STEEL RAILS.

The *Iron Age* lately published a table showing the cost, month by month, of coal, pig iron and steel rails for ten years, ending with December, 1890. The figures were taken from the books of a leading mill which ranks among the prosperous concerns of the country. This company produced its own coal, and made the greater part of the pig iron consumed; but some of the pig iron used in rail making is purchased, generally at a higher price than the cost of making, so that the cost of the pig iron shown in the table "cannot, of course, be taken as the basis of computations affecting the cost of rails." We have calculated the averages by years, from the tables of monthly costs at the mill, showing the average cost of coal, pig iron and steel rails for each year, and we add the ratio between the cost of rails and of the pig iron, and the average yearly prices of steelrails at works in Pennsylvania, as returned by Mr. Swank:

Year.	Average Cost. Coal.	Pig iron.	Rails.	Ratio of rai'ls to pig iron.	Average price.	Per cent. of cost to market price.
1881	$1 44	$26 11	$43 31	1.659	$61 12	71
1882	1 46	22 89	43 90	1.525	48 50	91
1883	1 29	18 97	35 51	1.889	37 75	94
1884	1 06	17 21	28 91	1.626	30 75	94
1885	1 08	15 74	27 24	1.730	28 50	96
1886	1 12	17 60	29 05	1.651	34 50	84
1887	1 11	18 21	30 28	1.657	37 12	82
1888	1 12	17 39	28 77	1.654	29 88	96
1889	1 14	15 26	26 07	1.708	29 25	89
1890	1 16	15 83	28 99	1.831	31 75	91
Average for 10 years	1 20	18 52	32 21	1.739	36 85	87

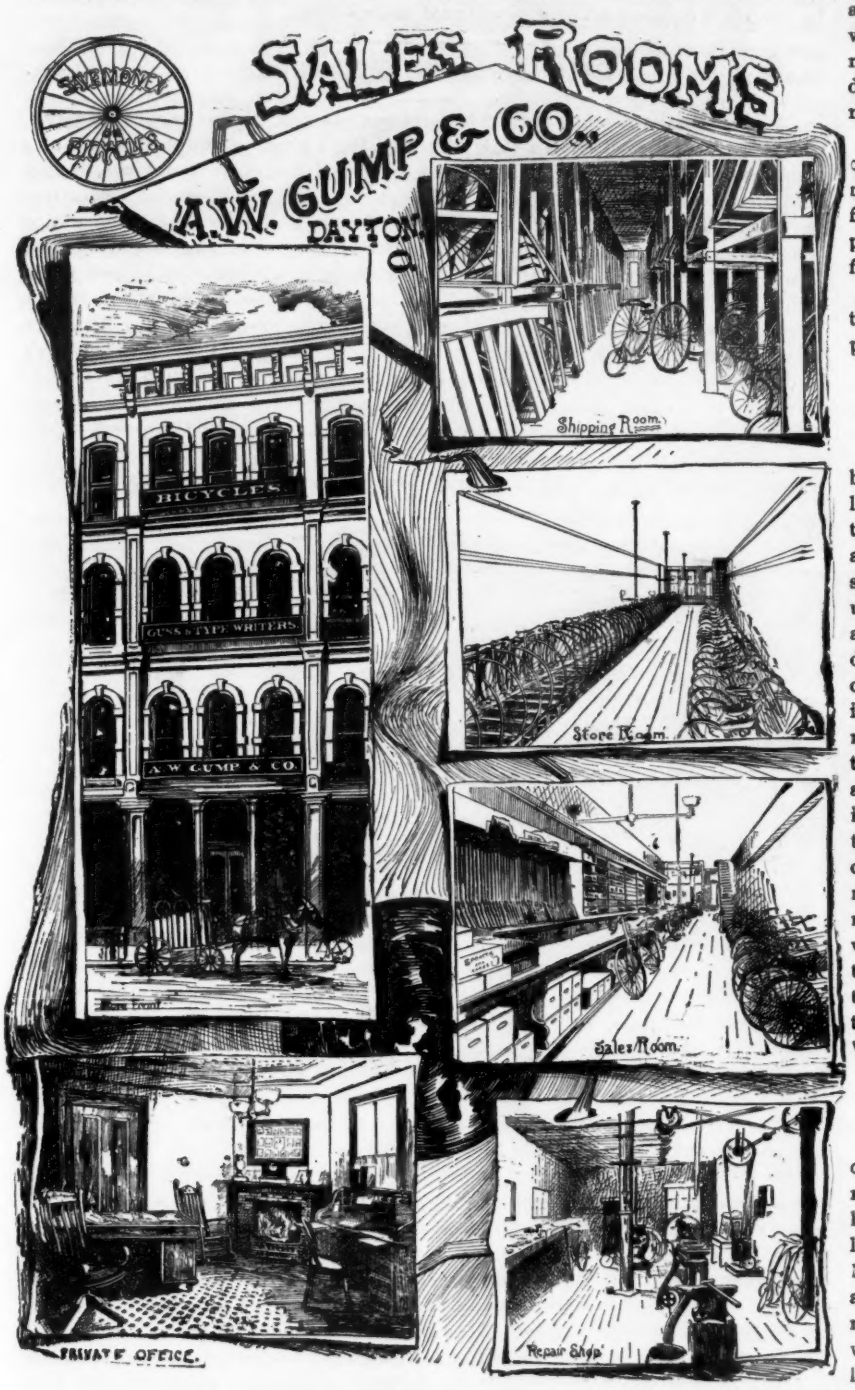
An inspection of the table will show that while the cost of pig has fallen, through the decrease in freight rates and improved furnace practice, of which so much has been written since Mr. Gayley read his paper before the Iron and Steel Institute, the ratio between the cost of rails and pig iron has been remarkably constant. This warrants the inference that improvements in rail mills have proceeded hand in hand with those in blast furnaces. A comparison of the price of Bessemer pig iron, at Pittsburgh, with the price of steel rails in Pennsylvania, will show about the same ratios as given above, with rather larger variations, extremes running from 1.55 to 1 91.

These improvements in steel rail mills have been made both by building larger mills, and on the lines laid down by A. L. Holley, at a meeting of the Iron and Steel Institute, in 1881: "The better adaptation of plant lay in more mechanical appliances and in more convenient appliances; in duplicate machines where there was danger of breakdowns; in large and convenient spaces for the men to work in; in short, in providing for all the operations of steel making."

The relation between the cost and price has not been so regular. In 1881 the difference between the mill cost and the average price in Pennsylvania was $17 81, but in 1888 this difference was only $1.11, and a comparison of monthly costs with Mr. Swank's tables of average monthly prices will show a good many months in which the profits were on the wrong side of the ledger. Moreover, the tables are probably averaged from the market quotations, whereas the average figured from actual sales would show a lower price, as the large sales are all made at the lowest rates.—[Railroad Gazette.

A BICYCLE EMPORIUM.

One of the oldest, and to day one of the most successful bicycle houses in the country, is that of A. W. Gump & Co., of Dayton, O. Established in 1874,



they commenced handling bicycles in 1880, and by persistent and skillful advertising, supplemented, and backed up by fair and honest dealings, they have gained for themselves an enviable reputation second to none in their line of trade. It has been a keystone in their business to give their customers the benefit of every bargain they secure, in fact, the mystic words "Save Money on Bicycles," are always associated with their firm name.

Because they sell job lots and second-hand wheels at cut rates, it must not be taken for granted that they do this with every wheel they handle. By no means. They are agents for every American cycle on the market, but, on brand new current patterns, the list price is rigidly maintained, as is right it should be. Another feature which is of great benefit to their customers is, that they take second-hand wheels, guns, revolvers or typewriters in part payment on any wheel in their stock. The price must be right, but if it is, exchanges of this kind are as welcome as cash, and they are often a great convenience to the purchaser.

They are centrally located and have every facility for shipping to any part of the country, and, being large shippers can always secure the best rates for their customers, so that distance is but a trifle to them, their trade now extending to every corner of the United States, as well as Bermuda, Mexico and South America.

On many makes of wheels, Messrs. A. W. Gump & Co. are in a position to give local dealers the benefito f manufacturer's discount, and the order can be filled either from the factory or from Dayton, whichever is more convenient.

The illustration accompanying this article will give the reader an excellent idea of the exterior as well as the interior of their four-story building, which, though large, is oftentimes crowded to its utmost capacity, and whichat this date (March 15) actually contains over 1,200 wheels.

Entering their four-story building, which is situated at 115 East Third St., you find yourself in their retail sales room, which is about 120 feet deep and well stocked with current pattern wheels, guns, typewriters, etc. Immediately back of this is the general office, where a number of clerks are kept busy attending to the correspondence and details, which the shipping of so many wheels necessarily demands. Back of this is the private office, and in the rear, the repair shop where skilled mechanics, with special tools, are ready to do anything that can possibly be done for a bicycle, turning out the old machine as good as new.

The basement is used to store crated bicycles in, and is generally filled to overflowing. On the second and third floors, bicycles of all kinds, sizes, makes and ages are ranged; they vary in size from small wheels suitable for five or six-year-old tots, to ordinaries 64 inches in size, and the difference in price is almost as marked, ranging from $10 to $135. The fourth floor is filled from floor to ceiling with crated wheels.

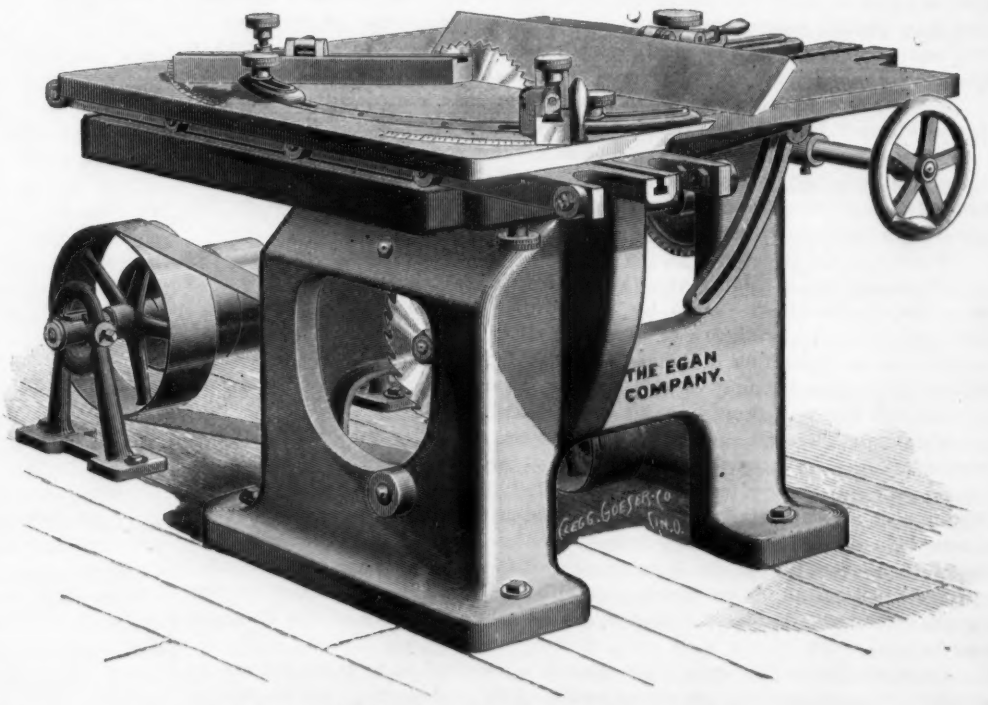
Their wholesale trade is increasing every year and as dealers are giving them their orders in lots of 100 and more, they are surely in position to make prices right.

IMPROVED DOUBLE RIP AND CROSS-CUT SAW.

In this mechanical age, builders of machinery are very prolific in the bringing out of new improvements to save the largest amount of time and labor. The leading concern to recognize the fact that machinery users want the most advanced type is the celebrated Egan Co., which has recently devised a new combined rip and cross-cut saw, with tilting table, illustrated herewith, specially arranged for edging, ripping and cross-cutting; designed for general use, and specially adapted for pattern-makers and for accurate work. It will also be found a very useful machine for furniture and cabinet factories, sash, door and blind, also carriage factories. Its construction is very simple, and can be changed to suit the work desired in a very few minutes. The column is one entire casting, with the saw mandrel arranged to revolve around a common center inside the column, so that when the ripping saw is above the table, the cut-off saw is below the table, and for grooving, either saw can be brought above the table according to the depth of groove to be cut. The table is of iron, made in two sections, both sections planed perfectly true, and the one at the left of the saw made to work back and forth on rollers, for edging or cross-cutting. There are two miter fences for cutting right and left, and one ripping fence, all accurately fitted to the table and in line with the saw. The mandrels are of the best quality of steel, running in self-oiling boxes lined with the best genuine Babbitt, and driven from a counter-shaft placed clear of the column, a decided improvement over all others. The builders recommend this machine as the best of its kind made. For further information in regard to this, address the originators and builders, the Egan Co., Nos. 251 to 271 West Front street, Cincinnati, O.

Incandescent Lamps and the Eyes.

It is becoming quite the fashion now for doctors to discuss the evil effects of the electric light on the eyesight, and all sorts of paragraphs are going the rounds of the daily press describing the injuries to their sight that people have suffered from the use of the incandescent lamp. There would be very little of this talk if people would only use a little common sense in the matter. Many think that because an incandescent lamp does not give out much heat and will not singe their whiskers or their hair, that they must have the lamps right under their nose or half a foot away from their eyes and directly level with them. This sort of thing would be injurious even with a glow-worm lamp, if there were such things. Incandescent lamps need to be properly placed and shaded so as not to cast their rays directly on the eyes, and if these very simple precautions were carried out there would be no need for the silly talk about the injurious effect of the electric light on the eyesight.—[Industrial World.



IMPROVED DOUBLE RIP AND CROSS-CUT SAW.

WILL VALLEY FURNACES MAKE THEIR OWN COKE?

The Youngstown *Telegram*, of May 28, after giving the results of the recent negotiations by Mahoning and Shenango Valley furnacemen for lower coke and rail rates, substantially as detailed in last week's *Iron Trade Review*, says:

The furnacemen were convinced that their defeat is due to the policy of the Pennsylvania Railroad, which has persistently refused to concede the rates desired by them. While the other lines are acting in harmony with it, the belief is that they were willing to grant the freight reduction.

The outcome so far as the coke men's position is concerned is surprising and unexpected. Until even last Saturday there were the best of reasons for believing that coke would be furnished at $1.75. Furnaces in the association, and out of it, were given to understand that the $1 75 rate would be made. A movement which got into full headway in Pittsburgh, yesterday, explains the quick change of front by Mr. Frick, and the unbending position maintained by Vice-President Thompson.

When the Mahoning and Shenango committee were in consultation with Mr. Frick they were run in upon by a crowd of Pittsburgh iron manufacturers, who, by their words and their presence, demonstrated that they were opposed to anything being allowed which would give the men in this section a chance to fairly compete with them. It was this same factor, perhaps, of its own volition but now probably agitated quietly by a certain other opposing interest, which almost commanded the railroads to remain invincible. The local manufacturers believe they have ascertained exactly who and how many are their friends.

Defeated as they have been by the railroad and coke interests it would be impossible for the furnaces to resume operations, if it were not for the consideration and co-operation of the ore producers. The ore men look at matters in the reasonable light which it was hoped others could. They see that if the furnaces in this region are not making iron, they will not take ore, and if the ore can not be sold, the lake ore mines will be worthless. Consequently a very material reduction in the price of ore has been made, giving the furnacemen a chance to eke out with a small margin.

One of the results of the five months' shut down is that the furnacemen here are now all positively convinced what several of them formerly believed, that they should manufacture their own coke. It would not be surprising if very soon a strong company is organized to furnish coke to the furnaces in Eastern Ohio and Western Pennsylvania, at reasonable prices.

Before the Mahoning and Shenango Valleys Iron Manufacturers' Association adjourned, last night, the following resolution was adopted:

WHEREAS, The Girard Iron Co., owned and operated by Alexander M. Byers, of Pittsburgh, Pa., has been a member of the Mahoning and Shenango Iron Manufacturers' Association from its origin, and has received all the advantages incident to such membership; and

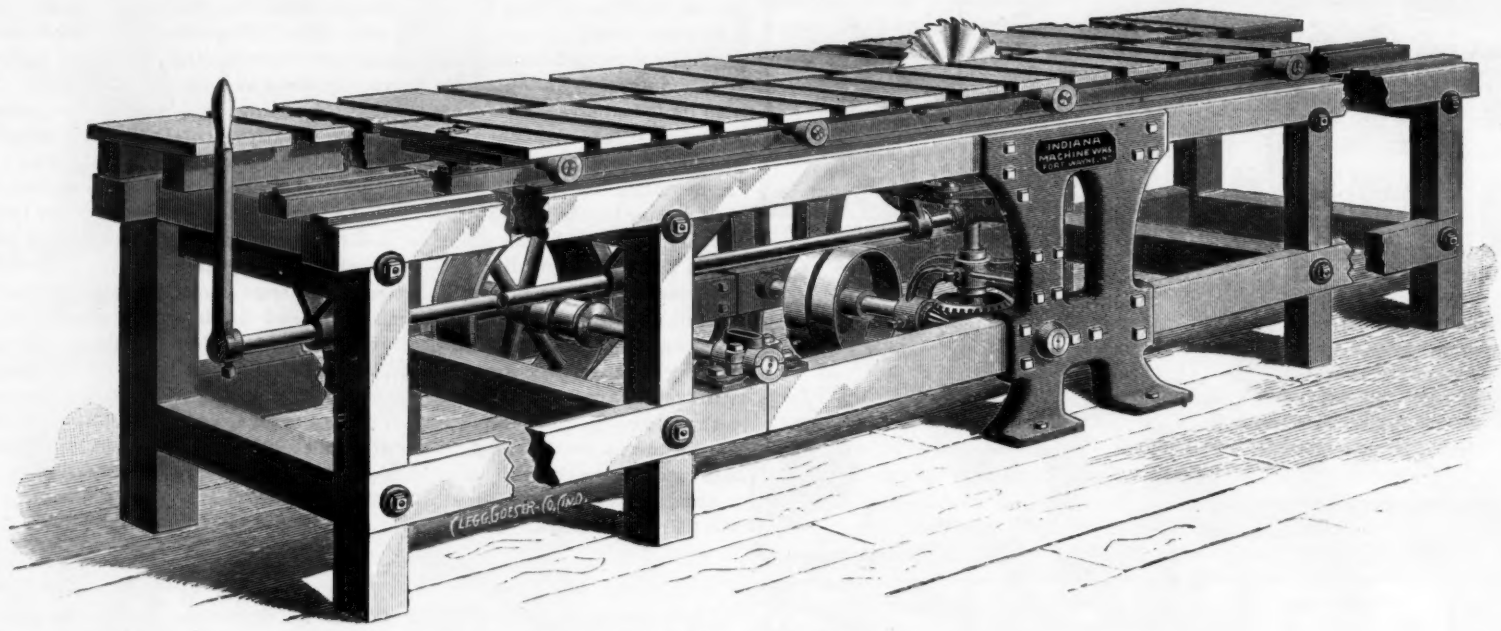
WHEREAS, On December 30, 1890, the blast furnace proprietors, members of said association, including the Girard Iron Co., in writing agreed to shut down their respective furnaces by January 10, 1891, and to keep them closed until such time as a majority of members should, at a meeting duly called, vote to resume operations thereat; the Girard Iron Co., having been especially zealous in the procurement of the making of said agreement and solicitous that the said furnaces should go out of blast, and

WHEREAS, The said agreement having been faithfully observed by all the other blast furnace proprietors, members of the association, the Girard Iron Co. has profited thereby, having been enabled to dispose of a large stock of pig iron at much better prices than could otherwise possibly have been obtained for it; and now, having reaped the benefits of said agreement, has resumed the operation of its furnace against the protest of the other parties, and has violated obligations which should be peculiarly sacred, because they are not enforceable by law, but rest alone on the good faith of the obligers, now be it

Resolved, That this association cannot longer afford to count among its members those whose motives are so sordid as to lead them to prefer gain to honor; a passing pecuniary advantage to the esteem and confidence of their associates, and their own selfish interests rather than the interests of those whom they have solemnly promised to regard; and that therefore the action of the executive committee in expelling the Girard Iron Co. from the Mahoning and Shenango Iron Manufacturers' Association is unanimously endorsed by the blast furnace proprietors of said association.

PATENT POWER FEED EDGER.

We herewith present a correct illustration of a new "labor saver"—a power feed edger, designed with a view of producing a great amount of work at a small cost. It has embodied in it many new and convenient devices, is self-contained, simple in construction, and does not require expensive operatives to run it. The working parts are entirely of iron and steel, and the machine is so made that it may be shipped in sections, thus reducing transportation charges. The frame supporting working parts is of iron, cast in heavy and well-ribbed pieces thoroughly girted and bolted together. The arbor is of a large diameter and made of refined steel, running in long, self-oiling bearings. The friction feed work is of a new principle, consisting of three power-driven feed rolls, and two steel ribbons, the latter being fastened to the underside of carriage, extending downward and passing edgewise on either side and between center and outside rolls. A lever placed in convenient reach of operator enables him to engage the center and right hand outside roll upon the ribbon, producing a forward movement, and when carriage has traveled



PATENT POWER FEED EDGER.

proper distance, to stop same or engage the reversing rolls with the same lever, thus giving complete and absolute control of machine. There are two speeds of feed, namely 80 feet and 120 feet per minute, and if desired can increase it. The table and frame are made of well-seasoned stock, the upper girts of latter being cast iron and all firmly bolted together The carriage is very light and stiff; it is provided with rolls running on V and flat track, and the length of same is made to suit purchasers. The countershaft is attached to machine and has tight and loose pulleys 10 inches in diameter by 6 inch face; it should make 850 revolutions per minute. It is made by the Indiana Machine Works, Fort Wayne, Ind.

Oil Fuel in Canada.

Recently a deputation of manufacturers waited upon the Canadian Finance Minister and presented him with a petition asking that crude petroleum, for fuel, be placed upon the free list. The petition stated as follows:

We beg to submit the following statement regarding the duty on petroleum as affecting its use as fuel for furnaces: (1) About three years ago petroleum was introduced as fuel for furnaces into Canada under American patents, which covers the burning of petroleum with air. (2) The plant required for this process is costly, and several manufacturers have gone to great expense in putting it in. (3) At the time they put in the plant petroleum could be bought f. o. b cars, at Petrolea, for $1 per barrel; now it is $1 36 per barrel. (4) When petroleum was $1 per barrel there was a saving in using it for fuel, as compared with anthracite coal, of about 25 per cent; now when the price of petroleum advances there is no saving, but rather a loss, and the manufacturers who have put in plant for burning oil lose not only the profit they expected, but the interest of the money invested in the plant. (5) Should petroleum advance, which is usual in the Fall and Winter months, manufacturers who have put in plant for burning it will have to take out their plant and change their furnaces for coal, consequently losing the cost of said plant, and having the additional expense of altering these furnaces to coal burners. (6) Petroleum in Buffalo is about 75 cents per barrel, but the duty on it is $2 45 per barrel, over 300 per cent. (7) In order to avoid this loss, we request the Government to allow petroleum, when imported by manufacturers for their own use for fuel, to come free. (8) Anthracite coal is admitted free, and we respectfully submit that, although petroleum is found in Canada, the supply is not sufficient for it to be sold at such a price that it can be used for fuel instead of anthracite coal, that the labor in pumping from the well is much less than mining coal, therefore, the producers of petroleum will not be injured by the duty being removed. On the other hand, if the present duty is enforced it will be a permanent check to our many industries.

STATUS OF THE NAIL TRADE.

The statistics of the production of nails in 1890, recently published by the American Iron and Steel Association, are not flattering to the manufacturers of cut nails. According to the statement the total quantity of cut nails made in the entire country in 1890 was only 5,640,946 kegs, although in that year more nails were turned out than ever before in the history of the American nail trade. The output of cut nails has been declining steadily since 1886, when they attained their maximum. In that year 8,160,973 kegs of cut nails were turned out. The drop to 5,640,946 kegs, in 1890, was a decline in the annual output of 2,520,027 kegs, or over 30 per cent. The shrinkage annually is shown in the following table:

Years.	Kegs of 100 lbs.
1886	8,160,973
1887	6,908,890
1888	6,493,591
1889	5,810,759
1890	5,640,946

During these years wire nails have been coming more and more into prominence. In 1886 they were not much of a factor, only 600,000 kegs having been turned out in that year. This production, however, was doubled in 1887, when 1,250,000 kegs are credited to this branch of the nail trade. In 1888 a further advance was made to 1,500,000 kegs, but the gain was hardly large enough to make wire nails seem very formidable as coming competitors. But in 1889 a decided jump was made to 2,435,000 kegs, and in 1890 the output reached 3,135,911 kegs, or more than half the production of cut nails in the same time. The following table of the total production of cut and wire nails shows how well the demand for nails has kept up during the years referred to, so that the falling off in the production of cut nails was not caused by a severe depression in the nail trade itself:

Years.	Kegs of 100 lbs.
1886	8,160,973
1887	8,158,870
1888	7 993,591
1889	8,245,758
1890	8,776,857

It is stated in the report of the American Iron and Steel Association that the output of wire nails in 1890 was credited to no less than 47 works. The production of 1891 will be still larger, because new works were started late in 1890, or early this year, while older wire nail works are enlarging their factories and otherwise improving their facilities. With regard to cut-nail operations, however, the outlook is less encouraging. From a well-informed representative of this branch of the nail trade we learn that there are to-day only about 26 factories now in the field for regular business. New England is credited with but one; New Jersey two; Pennsylvania six, of which one is expected to be shortly removed to Virginia; Virginia one; West Virginia four; Ohio five; Kentucky one; Indiana three; Missouri one; Colorado one; California one, These factories have all told, some 2,876 machines. The total number of cut-nail factories in the entire country is 75, with 6,066 machines. Less than half the capacity, therefore, appears to be active at present. Even in the famous Wheeling district there are but seven factories running now, and some of these are operated only spasmodically. It would be of interest to state the number of machines in the wire-nail factories, but for some reason the wire-nail manufacturers seem disinclined to report this information for publication, so that comparisons with cut-nail factories cannot be made on that basis.

Unremunerative prices is the reason assigned for the stoppage of a number of cut-nail factories. Nails are down to the level of cost or even below it except to the best equipped or most favorably located establishments, and cut-nail works are either rusting out in hopeless idleness or being converted into other kinds of factories to make products in which competition is not so severe. Unremunerative prices, however, do not tell the whole story with cut nails, because prices are lower on wire nails than at any previous time, and can hardly afford much of a profit, except to those works controlling in a large degree their own raw materials. Yet more wire-nail works are projected, and the capacity for producing wire nails goes on apace. The reason for this is, of course, that the wire-nail manufacturers feel sure of their hold on the nail trade, and look forward to an increasing business in the future. A few of the cut-nail manufacturers exhibit the same assurance concerning future trade, and are improving their equipment to keep in the race, but the great majority evidently feel that the cut-nail trade has seen its best days and that a reaction is not be expected.—[Metal Worker.

An Englishman's Views of American Trusts.

Mr. Plimsoll, a member of the English Parliament, in an article in the *Nineteenth Century*, has discovered that in the United States no less than 71 large combinations were organized in 1888-9. Some of these include many others, in all 490 "trusts" were organized in two years. They have been formed to control almost every branch of industry, including the manufacture of paper bags, coffins and pickles, and it is computed they include no less than $2,000,000,000, or considerably more than two-thirds of the entire manufacturing capital of the United States. Mr. Plimsoll is afraid that further attempts will be made to foster and develop this odious trust system in England, and he urges her legislators to rouse themselves promptly to the danger of this fearful menacing calamity. He suggests that a select committee or a royal commission should be constituted without loss of time, "to inquire into the whole of the subject."

Long Distance Telephoning.

An exchange describes a remarkable feat in the history of the telephone that was performed in London recently. The Paris end of the line which connects that city with London was switched on the Marseilles wire, and a conversation was carried on. Words spoken there were distinctly heard on the shores of the Mediterranean, 800 miles away.

INDUSTRIAL SUMMARY.

New Enterprises:—

J. B. Barrett & Co. will probably erect an iron foundry and machine shop, at Wytheville, Va.

The Cable Iron Car Roofing Co., East St. Louis, has filed articles of incorporation; capital, $300,000.

The Stanly Manufacturing Co. has been organized, at Bilesville, N. C., with a capital stock of $25,000.

The manufacture of a newly invented water wheel is to be commenced at Dexter, Me., by Witham Bros. & Co.

A Schenectady (N. Y.) firm are arranging to erect a foundry, at Lansingburgh, N. Y., which will employ about 100 men.

The J. L. Perry Machine Co., of Chicago, has been incorporated with a capital stock of $100,000, by W. S. Hoffman, J. P. McCourty and G. W. Kolb.

A blast furnace is to be erected at Buffalo, N. Y., on the site of the old Union Rolling Mill. Julian Kennedy, of Pittsburgh, has prepared the plans.

The Metal Construction Co., has been incoporated at Chicago, Ill., with a capital stock of $200,000. Incorporators, W. R. Norway, S. M. Randolphs and I. T. Dyer.

It is said that L. L. Hillman, Vice-President of the Tennessee Coal, Iron & Railroad Co. and his associates, will build a million-dollar steel plant at Birmingham, Ala.

L. Schutte & Co. are to erect a factory and machine shop at Twelfth and Thompson streets, Philadelphia. The building is to be 80 feet square and six stories high, with a basement.

J. L. Weitzel, H. W. Pierson, J. B. Reed and others have incorporated the Royal Cycle Co. for the manufacture and sale of bicycles, etc., at Baltimore, Md. The capital stock is $20,000.

A new foundry and rolling mill is to be established by Weber Bros., of Kansas City, at Clinton, Mo. The main building will be 60x150 feet, and the work of erection will be begun at once.

The Nickel Steel Co. has been organized, and have made application to the Ontario Government for a charter. The company intend to erect smelting works at a point on the north shore of Lake Huron.

It is announced that a plant for the manufacture of iron and steel on a large scale will be erected, at Harrisburg, Pa., within the next six months. The enterprise is projected entirely by local capitalists.

J. J. McDonough, L. M. Warfield, C. H. Dorsett and others have incorporated at Savannah, Ga., the Southern Mills Supply Co., to manufacture mill supplies, machinery of all kinds, etc. The capital stock is $50,000.

The Weeks Automatic Car Coupling Co., of New York City, has been incorporated, with a capital stock of $100,000; incorporators, Clayton Weeks, of Hobart; Charles Bray, of Kingston, and B. C. Andrews, of New York.

Henry B. Oliver, David B. Oliver, James B. Oliver, George E. Tener and C. D. Fraser will make application for a charter for the Allegheny Furnace Co. The company will operate Edith furnace, in Allegheny, which was recently leased by the Oliver interests.

The S. J. McCormick Co., of Pittsburgh, Pa., for the manufacture and sale of foundry facing and mill supplies, with a capital of $50,000, has been chartered, at Harrisburg. The directors are John S. McCormick and Frederick S. Hamm, of Pittsburgh, and M. Hawley Treadwell, of New York City.

The East Lebanon Iron Co. has been formed at East Lebanon, Pa., to erect a rolling mill at that place. The capital of the company is $100,000. N. E. Legat is President, and the remainder of the directory is composed of H. O. Nully, James E. Legat, J. R. Beckley, Daniel S. Light, J. B. Irish and H. T. Atkins.

Additions, Enlargements, Removals, etc.:—

The Paige Tube Co., at Warren, O., will add a foundry to its already large plant.

The Bluefield Iron Works Co., at Bluefield, W. Va., is to increase its capacity.

The Davis & Furber Machine Co.'s foundry, at North Andover, Mass., is being enlarged.

An addition is to be built to the plant of the Hoskins & Hinnerth Foundry Co., at Highgate, Vt.

The business of the Lamprey Machine Co., of Lake Village, N. H., will be removed to Cambridge, Mass.

The Chester Manufacturing Co., at Chester, Pa., have increased their capital stock from $50,000 to $100,000.

The Industrial Iron Works, of Bay City, Mich., are preparing to build an addition, 255x90 feet, to their works.

The Hendrick Manufacturing Co., of Carbondale, Pa., have broken ground for a new machine shop 140x40 feet.

The Western Iron Co., of Kansas City, Mo, will remove its plant and effects to Kenilworth Station, same State.

The Scott Machine & Hardware Co., at Denver, Col, are enlarging premises to double former size, and will put in several new tools.

It is stated that the Magnetic Machine Manufacturing Co., at Grand Rapids, Mich., will remove its motor works to Basic City, Va.

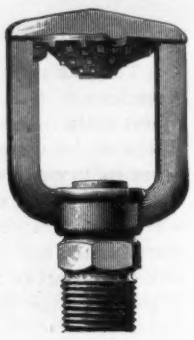
The McCormack Iron & Boiler Co., of Albany, N. Y., manufacturers of the Heine boiler, will erect a plant at Hudson, N. Y., and move their works to that place.

It is reported that the car works of Rochester, N. Y., will remove their plant to Johnson City, Tenn., where $100,000 will be expended in establishing it.

Lee & Hoff are erecting a new plant at St. Paul, Minn., for the manufacture of boiler tube expanders, which will be double the capacity of the old plant.

The Spang Steel & Iron Co., at Etna, Pa., is to make extensive additions

PROTECTING YOUR BUILDING With an automatic fire sprinkler system makes it absolutely fire proof. All Insurance Companies recognize the "Neracher" as the best made and will make liberal reductions on your present rates if you equip. In this way the system pays for itself inside of two years' time.



☞ Write us.

THE NERACHER SPRINKLER CO., - WARREN, O.

BRANCH OFFICES:

Boston, Chicago, St. Louis, Cleveland, Cincinnati, Minneapolis, Pittsburgh, New York, Philadelphia, Baltimore, San Francisco.

to its plant, including furnaces, new buildings and machinery, at a cost of $250,000.

The F. J. Meyers Manufacturing Co., of Covington, Ky., contemplate establishing a branch works at Chattanooga, Tenn., for the manufacture of architectural iron work.

It is reported that the United States Iron & Tinplate Co., at Demmler, Pa., will increase its capital stock to $500,000 in order to make extensive additions to its plant for the manufacture of tinplate.

The plant of the Pittsburgh Reduction Co., of Pittsburgh, Pa., manufacturers of pure aluminum, will remove from that city to the new town of Kensington, on the Allegheny Valley Railroad, about 20 miles from Pittsburgh.

Wm. Tod & Co., of Youngstown, O., are said to be preparing estimates on a tin mill with a capacity of 350,000 boxes annually, to be erected near Chicago. The concern is turning out a large molding machine for the Pittsburgh Malleable Iron Co.

Messrs. Morris, Williams & Bailey, Pittsburgh, Pa., manufacturers of cold rolled steel, have begun the erection of an iron-clad building, 85x45 feet, which will about double their present capacity. New rolls, engines and the other necessary equipment will be put in, and the present annealing furnaces enlarged to meet the increased demand.

The St. Louis *Age of Steel* says: There is pretty good grounds for believing that the Iowa Iron Works, of Dubuque, Ia., will be removed to this city. Representatives of the company have been here looking over the grounds with a view of selecting a site, and if a suitable one can be obtained another large plant will be added to our industries. As boat building forms a large part of the company's work, they are anxious to secure such a location on the river front as will best facilitate this branch of their business. They employ 200 men, but expect to increase the number to 300 when they get settled in larger quarters.

Fires and Accidents:—

The machine shops and bolt department of the Knoxville Iron Co., at Knoxville, Tenn., have been destroyed by fire.

The blacksmith and machine shops, together with valuable machinery, of the New York Central Car Works, at West Albany, N. Y., were destroyed by fire on the 21st ult. The loss is placed at $200,000, mostly covered by insurance.

On the 18th ult., the inserted tooth circular saw department of E. C. Atkins & Co., Indianapolis, Ind., was seriously damaged by fire, caused in starting up one of the forges in that department, the loss closely approximating $15,000, fortunately fully covered by insurance. A considerable stock of the goods made in the building destroyed was stored in company's warehouse, so that there will no interruption in the filling of orders. The work of rebuilding will be commenced at once.

General Industrial Notes:—

The Lehigh Car, Wheel & Axle Works, at Fullerton, Pa., are again in operation, with the exception of the axle department, recently burned. As the machinery was not materially injured, the forges will soon again be in operation.

The Lehigh mill of the Allentown Rolling Mills, at Allentown, Pa., went into operation on the 19th ult. as a spike and puddle mill. This mill has been idle several years, and was formerly used in the manufacture of bars, angles and girders.

Sealed proposals will be received at the office of the Supervising Architect, Treasury Department, Washington, D. C., until 2 o'clock P. M. on the 17th day of June, 1891, for all the labor and materials and fixing in place complete the low-pressure, return-circulation, steam-heating and ventilating apparatus required for the United States Postoffice, etc., building at Dayton, O.

The increasing Southern business of the Cambridge Roofing Co., of Cambridge, O., has made it necessary to open a factory at Chattanooga, Tenn. This will be a great convenience to their many Southern customers, besides relieving their Cambridge works. The roofing manufactured by this concern ranks among the best as is evidenced by this necessity for increased facilities.

The Hazelton Tripod Boiler Co., of Chicago, Ill., have changed the location of their office from 170 22nd street to 809 Monon Block, 320 Dearborn street. This is a more centrally located position, and they will be more accessible to their many friends and customers. They have also changed their Cleveland office from the Hollenden Hotel to 723 Perry-Payne Building, Superior street, and have placed Mr. Geo. A. Humphreys in charge vice Capt. Chas. Hallett, who formerly held that position.

The Wells Machine Works, of Fostoria, O., have given the Brass & Iron Works, of Fostoria, exclusive license to manufacture and sell their entire line of well making machinery and tools, and have turned over to them pattern, stock and good will in the business. Persons interested in this line will do well to send to them for description and prices of the latest improved machinery of this kind in the market. The Wells Machine Works will make a specialty of their pipe cutting and threading machinery and tools.

Mr. L. M. Moyes, who has, for several years, so successfully occupied the position of Manager of the Philadelphia office of the Babcock & Wilcox Co., will leave that position July 1st. The Philadelphia office and the district pertaining thereto, consisting of the Eastern part of Pennsylvania, Southern New Jersey and the State of Delaware will, on that date, be attached to the Pittsburgh office. Mr. W. C. Temple, the present manager of the Pittsburgh office, will thus have charge of the three offices of the Babcock & Wilcox Co., at present located in Pittsburgh, Philadelphia and Cleveland, making the entire district of the Pittsbugh office embrace the States of Pennsylvania, Delaware, West Virginia, one-half of Ohio and one half of New Jersey. Mr. George A. Humphreys, who has been in charge of the Cleveland office, will be succeeded by Mr. Paul B. Huyette, at present attached to the Pittsburgh office. The business of the Pittsburgh office is reported as being very good for the present dull times. The following sales have been made in the last 30 days: North American Construction Co., 104 H. P.; J. B. Ford & Co., 960 H. P.; Edith Furnace, 250 H. P.; Thomas Furnace, 250 H. P.; Allegheny Gas Light Co., 250 H P.; Oliver & Roberts, 500 H. P.

Mining Iron Ore Under Water.

A letter which we have received from Mr. George H. Stickney, of Baltimore, under the date of May 20, 1891, says: "Some eight or ten years ago a man sunk a caisson off the shore of Fort McHenry (Whetstone Point) and mined a small quantity of iron ore. He continued operations for several years, shifting his tank from place to place. Later, within two years, the same man, or some other, has been grappling three or four tons per week of good ore from the ledge that crops out in the bed of the river at this point. These are the only recent attempts to mine the ore. There is, I think, quite a quantity of carbonate ore there of fine quality, but the expense of getting it from under water is too great to justify any attempt to recover it."

Another correspondent at Baltimore writes as follows: "I ascertained from one of our harbor officials that one of the caissons used for obtaining the ore was still in the water of Fort McHenry and could be seen at low tide, the top having been rusted off; also that when the steam dredgers were working in the channels iron ore was frequently brought up and the workmen saved it, sometimes gathering seven or eight tons a week. There is an individual here who is in the habit of diving for chunks of this ore whenever the water is warm enough, and I am told that he makes a fair living in his competition with the great iron mines of the world. I also remember when the Baltimore & Ohio Railroad Co. was building one of its elevators at Locust Point, it had to blast the iron ore away to give water depth alongside, also that the piles driven were steel pointed, so as to get them into the hard iron-stone far enough to stand."

The ore referred to was largely used as early as 1725 by the Principio Co., of Principio, Md. It has long been called "hone," or "white" ore; hence the name of the locality where it is found, "Whetstone Point." Swedenborg, in his *De Ferro* (1734), says that the ore used by the Principio Co. was "of a white or gray color, not unlike the vases of Holland pottery."—[Bulletin of the American Iron and Steel Association.

A Daring Project.

One of the features of the coming electrical exhibition at Frankfort-on-the-Main will be the transmission of power on a scale hitherto never attempted. When it was announced some months ago that it was proposed to transmit 100 horse-power from Laufen-on-the-Neckar to Frankfort, a distance of more than 100 miles, the statement was received with smiles of incredulity, but now it seems quite probable that not only will the experiment be tried, but that

it will succeed, in spite of the engineering difficulties that have to be surmounted. The government has been asked to supply line for the purpose, and on the system used the expense will not necessarily be at all severe, for the use of very high potential alternating currents is the feature of the scheme as at present planned. The alternating generator will supply a step-up transformer that in turn would transmit its secondary current at an enormously high potential along the line, to be re-tranformed by a step-down transformer at Frankfort to a potential practicable for an alternating motor. A series of experiments carried out recently at Oerlikon involve the use of pressure as high as 33,000 volts on the line. At such a potential the current transmitted becomes so small that the line is a relatively small factor in the losses incurred though it be of the extreme length proposed. Nothing can better illustrate the characteristic advantages of the alternating system than this beautiful process of generating and utilizing currents at a moderate potential, and transmitting them from station to station at a pressure so enormous that the losses in transit become insignificant.—[Electrical World.

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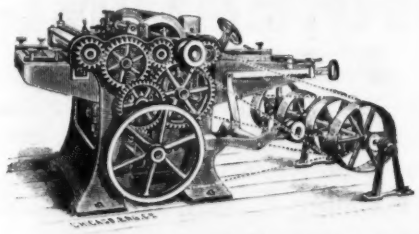

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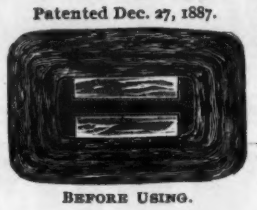

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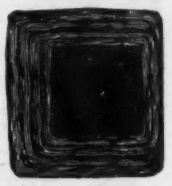

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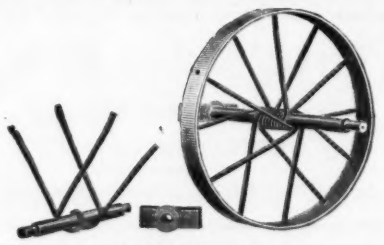

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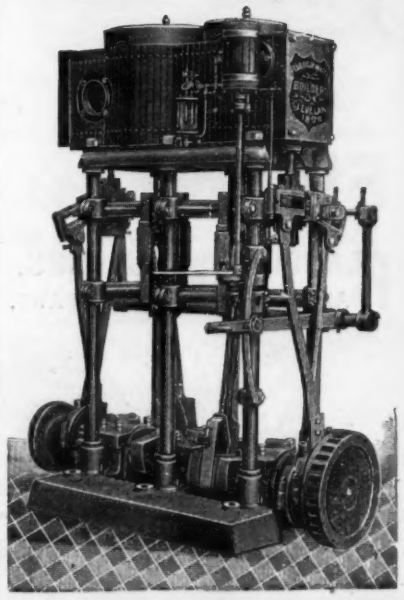

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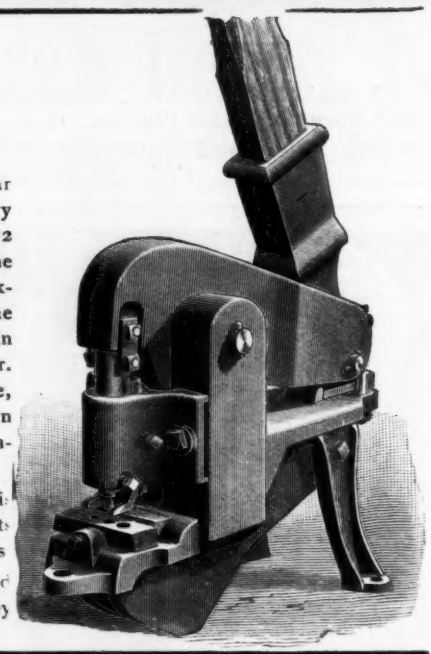
The cut to the right represents GARGRAVE'S IMPROVED PUNCHING MACHINE. It is very compact, and occupies a space of 10 x 20 inches. No expense is spared in its manufacture, and it is a first-class machine in every particular. It is made in two sizes

The prices of shears range from $16.00 to $25.00 and they will cut cold iron up to 5/8x2 and 7/8 round. The prices of Punches are $30.00 and $40.00. They will punch 1/2 inch hole in 3/8 inch iron. **A liberal discount to the trade.**



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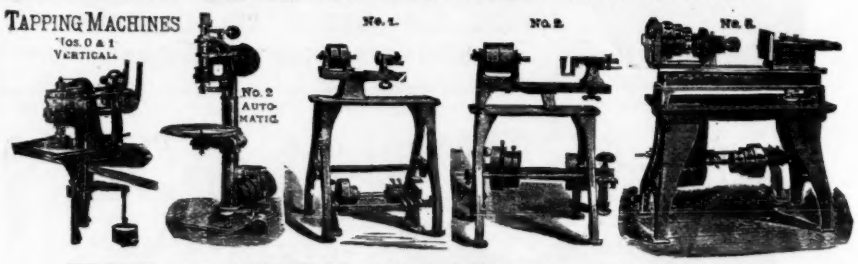

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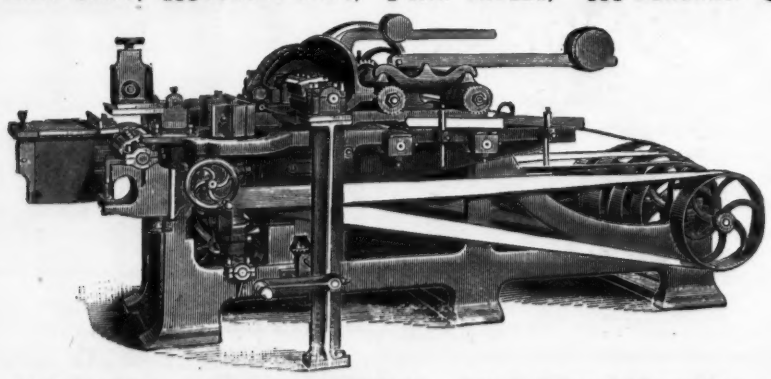

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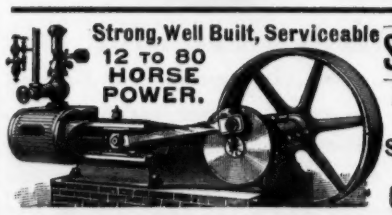

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CHICAGO (reported by Messrs. Rogers, Brown & Merwin): Southern Coke No. 1 foundry, $16 25@17 00; Southern Coke No. 2 Foundry, $15 50@16 50; Southern Coke No. 3 Foundry, $15 00@16 00; Southern Coke No 1, Softeners, $15 50@16 50; Southern Coke No. 2, Softeners, $14 75@15 50; Ohio Silveries No. 1, $17 75@18 75; Ohio Silveries No. 2, $16 75@18 75; Ohio Strong Softeners No. 1, $18 00@19 00; Ohio Strong Softeners No. 2, $17 25@18 25; Lake Superior Charcoal Nos. 1 to 6, $18 00@19 00; Tennessee Charcoal No. 1, $18 00@19 00; Tennessee Charcoal No. 2, $17 50@18 50; Southern Standard Car Wheel, $21 00@23 00; Tennessee Standard Car Wheel, $00 00@00 00.

CINCINNATI (reported by Rogers, Brown & Co.): FOUNDRY IRONS—Southern Coke, No. 1 foundry, $15 00@15 25; Hanging Rock Coke, No. 1 foundry, $16 50@17 50; Jackson Co. Stone Coal, No. 1 foundry, $16 50@17 00; Tennessee Charcoal, No. 1 foundry, $16 50@17 50; Hanging Rock Charcoal, No. 1 foundry, $20 00@22 00. MILL IRONS—Standard Southern Coke, grey forge, $13 00@13 50; Standard Southern Coke, mottled, $12 50@12 75; Cold Short Southern Coke, grey forge, $12 75@13 00; Strong Ohio Neutral Coke, grey forge, $15 00@15 50. CAR WHEEL AND MALLEABLE—Standard Alabama Car Wheel, $20 00@20 50; Tennessee Car Wheel, $18 50@19 50; Lake Superior Car Wheel, $19 00@20 50.

BUFFALO (reported by Rogers, Brown & Co): Mahoning and Shenango Valley strong, No. 1 Foundry, $ 7 00@00 00; Mahoning and Shenango Valley strong, No 2 Foundry, $16 00@00 00; Ohio Softener No. 1, $ 7 0 @00 00; Ohio Softener No. 2, $ 6 00@00 00; Jackson Co., Silvery No 1, $ 8 25@00 00; Jackson Co. Silvery, No. 2, $17 25@00 00; Lake Superior Charcoal, $18 50@00 00; Tennessee Charcoal, $18 50@00 00; Southern Softener No. 1, $16 25@00 00; Southern Softener No. 2, $15 50@00 00; Southern Strong No. 1 Foundry, $17 00@00 00; Southern Strong No. 2 Foundry, $16 25@00 00; Alabama Car Wheel, $22 00@22 50; Hanging Rock Charcoal, $23 00@24 00.

LOUISVILLE (reported by Hall Bros. & Co.) HOT BLAST FOUNDRY—Southern coke No. 1, $14 25@14 50; Southern coke No. 2, $13 75@14 00; Southern coke No. 3, $13 25@13 50; Mahoning Valley (Lake ore mixtures), $00 00@00 00; Southern charcoal, No. 1, $16 50@17 00; Southern charcoal, No. 2, $16 00@16 50; Missouri charcoal, No. 1, $17 00@17 50; Missouri charcoal, No. 2, $16 50@17 00. FORGE—Neutral coke, $12 50@13 00; Cold short, $12 50@13 00; Mottled, $12 00@12 25. CAR WHEEL AND MALLEABLE—Southern (standard brands), $19 50@2 0 ; Southern (other brands), $17 50@18 00; Lake Superior, $20 50@21 50.

ST. LOUIS (reported by Rogers, Brown & Meacham): HOT BLAST COKE AND CHARCOAL—Southern Coke No. 1, $15 50@15 75; Southern Coke No. 2, $14 75@15 00; Southern Coke No. , $ 4 00@14 25; Southern Grey Forge, $13 50@13 75, Southern Charcoal No. 1, $17 75@18 00; Southern Charcoal No. 2, $17 25@1 50; Missouri Charcoal No. 1, $15 50@16 00; Missouri Charcoal No. 2, $15 00@15 50; Ohio Softeners, $18 00@19 00. CAR WHEEL AND MALLEABLE IRONS—Lake Superior, $20 00@20 50; Southern, $19 00@2 00. CONNELLSVILLE COKE—East St. Louis, $0 00; St. Louis, $0 00

DETROIT (reported by William F. Jarvis & Co.): Lake Superior Charcoal, all Numbers, $18 00@18 50; Lake Superior (coke) Bessemer, $18 00@18 50; Katahdin (Maine charcoal), $23 50@24 00; Lake Superior Coke, Foundry, all ore, $18 00@18 50; Lake Superior Coke, Foundry, all ore, $00 00@00 00; Standard Ohio Black Band, $18 00@18 50; Southern No. 1 $16 25@16 50; Southern Gray Forge, $14 00@.4 50. Jackson County (Ohio) Silvery, $18 25@18 75; Old Car Wheel, $00 00@00 00. Connellsville Coke, $0 00

LOUISVILLE (reported by Geo. H. Hull & Co.): Southern Coke No. 1 Foundry $14 50@15 00. Southern Coke No. 2 Foundry $13 75@14 25; Southern Coke No. 3 Foundry $13 25@13 75; Grey Forge, $12 75@13 25; Southern Coke Silver Grey, $00 00@00 00; Southern Charcoal No. 1 Foundry, $16 00@17 00; Car Wheel, $17 00@20 00.

PITTSBURGH (reported by A. H. Childs): No. 1 Foundry, $1 00@16 25; No. 2 Foundry, $15 00@.6 25; Grey Forge, $14 00@14 25; White and Mottled, $13 00@13 50; Warm Blast Charcoal, $18 00@20 00; Cold Blast Charcoal, $20 00@27 00; Bessemer, $15 75@16 00.

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1½ to 6 by 1¼ to 2 inch	2 20
1¼ & 1½ by ⅜ to ½ inch	1 90
1 & 1¼ by ⅜ to ½ inch	2 00
⅛, ¼ and ⅜ by ⅜ to ½ inch	2 20

Round and Square.

1 to 1⅞ inch	1 80
2 to 2⅝ inch	2 00
2⅝ to 3½ inch	2 50
3⅝ to 4 inch	2 80
4⅛ to 4½ inch	3 30
4⅝ to 5 inch	3 50

Oval.

⅜ to 1¼ inch	2 20
½ to ¾ inch	2 40
⅝	2 60
¾	3 00

Half Oval and Half Round.

1¼ to 3 inch	2 90
⅝ to 1¼ inch	2 50
½ to ¾ inch	3 10
⅜	3 30
¼	4 80

Heavy Band.

⅝ to 6 by ½ and 5-16 inch	2 00
⅝ to 1½ by ½ and 5-16 inch	2 10
⅝ to ⅞ by ½ and 5-16 inch	2 30
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1¼ to 4, Nos. 13 to 15	2 60
1¼ to 2, Nos. 16 to 18	2 70
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15-16, 1 and 1⅛, Nos. 16 to 18	2 90
15-16, 1 and 1⅛, Nos. 19 and 20	3 00
15-16, 1 and 1⅛, No. 21	3 10
15-16, 1 and 1⅛, No. 22	3 20
⅞, Nos. 13 to 15	3 00
⅞, Nos. 16 to 18	3 10
⅞, Nos. 19 and 20	3 20
⅞, No. 21	3 30
⅞, No. 22	3 40
13-16, Nos. 13 to 15	3 20
13-16, Nos. 16 to 18	3 30
13-16, Nos. 19 and 20	3 40
13-16, No. 21	3 50
13-16, No. 22	3 60
¾, Nos. 13 to 15	3 30
¾, Nos. 16 to 18	3 50
¾, Nos. 19 and 20	3 60
¾, No. 21	3 70
¾, No. 22	3 80
11-16, Nos. 13 to 15	3 50
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11-16, No. 21	3 90
11-16, No. 22	4 00
⅝, Nos. 13 to 15	3 80
⅝, Nos. 16 to 18	4 00
⅝, Nos. 19 and 20	4 10
⅝, No. 21	4 20
⅝, No. 22	4 30
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Light Band.

1⅛ to 6 by 1/16 to 3-16 in	2 20
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1 to 1⅛ by 1/16 to 3-16 in	2 40
1 to 1⅛ by Nos. 11 and 12	2 50
⅞ and 13-16 by 1/16 to 3-16 in	2 70
⅞ and 13-16 by Nos. 11 and 12	2 80
¾ and 11-16 by 1/16 to 3-16 in	3 00
¾ and 11-16 by Nos. 11 and 12	3 10
⅝ and 9-16 by 1/16 to 3-16 in	3 30
⅝ and 9-16 by Nos. 11 and 12	3 40
½ by 1/16 to 3-16 in	3 60
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Wagon Box Iron.

⅜ inch, beveled edge, by Nos. 11 and 12	2 80
⅜ inch, " " " 13 and 14	3 00
½ inch, " " " 11 and 12	3 10
½ inch, " " " 13 and 14	3 30

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No. 10 to 14	2 65
No. 15 to 17	2 75
No. 18 to 21	2 99
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Iron Boiler Plates.

Tank, ¼ inch and heavier	2 60
C No. 1, " "	2 85
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Extra Flange, "	4 35
Solid Fire Box "	5 10

Steel Boiler Plates—1-4 in. and Heavier.

Tank	2 75
Shell	3 15
Flange	3 45
Marine Flange	3 85
Fire Box	4 55

Above includes plates 90 inches wide.

90 to 96 in. wide	⅛c lb extra
96 to 100 in. wide	1 c "
100 to 104 in. wide	1⅛c "
104 to 116 in. wide	special

American Cast Tool Steel.

ROUND, SQUARE AND OCTAGON.	cts. lbs
1 to 2 in. inclusive	09
9-16 to ⅞ in "	09
7-16 to ⅜ and 2⅝ to 3 in	10⅛
3⅛ to 4 in	11
⅜ to 11-16 and 4⅛	10⅛
⅛ to 6 in	11⅛
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5-6 in	14

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	cts. lbs
2 to 9-16 wide by 2 to ⅛ thick	9

Bessemer and O. H. Steel.

Machinery	base price.	2 75
Tire	"	2 75
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Sleigh Shoe	"	2 75
Toe Calk	"	3 00
Cutter Shoes, tapered and burr.	"	3 00

English Tool Steel.

Jessop's	16c
Hobson's "Best"	16c
" "Choice"	16c

Burden Boiler Rivets.

⅛, ⅙, 11-16 and ¾ inches diameter	4 00
Bridge ⅛, ⅙, 11-16 and ¾ inch diam	4 00

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NET TONS	
No. 1 R. R. wrought scrap	$19 00
No. 1 wrought scrap	17 00
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Iron axles	24 00
Axle turnings	13 50
Wrought turning (free from cast)	12 00
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Steel boiler plates	17 00
Grate Bars	8 00
Pipes and flues (Clean)	13 50
Tank iron	13 50
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Sheet iron	9 50
Wrought drillings	11 00
Malleable iron	10 00

Reported by Messrs. BLACK & POLLOCK, Cincinnati, O.:

Railroad Wrought	$20 00
No. 1 Country Wrought	17 00
Stove Plate	8 75
Machine Castings	11 00
Hoop and Sheet	8 00
Casting Borings	9 00
Wrought Turnings	12 00

CLEVELAND ROLLING MILL CO.,

MANUFACTURERS OF

BESSEMER STEEL RAILS,

Blooms and Billets, Steel Angles, Forgings, Bar and Spring Steel. Steel Street Rails, Steel Oil Barrel Hoops, Wire of all Kinds, Iron and Steel Boiler Plates, Galvanized and Black Sheet Iron, Corrugated Iron Roofing, Sheet Steel.

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MANUFACTURERS OF

SHEET IRON AND SHEET STEEL

Squared Roofing Sheets a Specialty.

CAMBRIDGE REFINED IRON. TRADE MARK

CAPACITY RANGES FROM No 30 26 INCHES WIDE TO 1-4×40×120

CAMBRIDGE SOFT STEEL. TRADE MARK

CORRESPONDENCE SOLICITED

OFFICE AND WORKS CAMBRIDGE, OHIO.

Magnetic Concentration of Iron Ore.

Ball-Norton (Monarch) Electro Magnetic Separator.

Phosphorus, sulphur, silica, hornblende and other impurities eliminated from Iron Ore, and non-Bessemer ore converted into Bessemer Ore. Samples treated without charge. Correspondence solicited.

H. E. COLLINS & CO., Agents Magnetic Separator Co.,

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DALLIBA, CORRIGAN & CO.,

DEALERS IN

Iron Ore & Pig Iron,

Rooms 716, 717, 718, 719 Perry-Payne Bld'g.

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Successors to Tuttle, Oglebay & Co.,

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FROM MARQUETTE, GOGEBIC AND MENOMINEE DISTRICTS,

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AND METALS.

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Cleveland Iron Mining Co.,

Dealers in Iron Ores

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MINERS AND SHIPPERS OF

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Mines on the Cleveland, Lorain & Wheeling R. R. Capacity, 3,000 tons daily.

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JAS. PATTERSON, Sales Agent.

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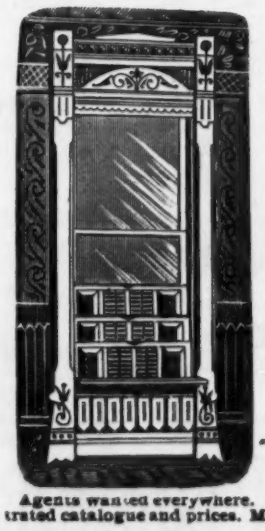
Saws, Tools and Machinery.

Office and Warerooms, 28 Columbus st. Factories on Columbus, Winter and Leon ard streets.

Cleveland, O., U. S. A.

Hartman's Patent Inside Sliding Window Blind



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HARTMAN & DURSTINE, No. 59 Beaver St. Wooster, O.

MACHINERY SUPPLY MARKET.

Anvils.

American.....₩ lb 9@10
Wrights.....₩ lb 12

Bellows.

Blacksmiths' { Hill's.....dis 40 / Bullock's.....dis 50&10
Moulders'.....dis 40@40&10
Hand.....dis 40&10@50

Belting.

Boston Belting Co's standard.....dis 70
" " " extra.....dis 60&5
" " " best.....dis 55
Hoyt's Short Lap.....dis 45
Cleveland Rubber Co. extra standard..dis 60&10
Shults Raw Hide Leather Belting, single.....dis 40
Shults Raw Hide Leather Belting, double and Light Double.....dis 40
Standard, oak tanned.....dis 50&10
Alexander Brothers' pure oak tanned....dis 45

Blowers and Exhausters.

B. F. Sturtevant's.....dis 20
Boston Blower Co.....dis 35
Buffalo.....dis 35

Borax.

.....₩ lb 12

Chalk.

White.....₩ gross 50
White Crayon.....₩ gross 12@12½ dis 10
Red.....dis 70
Blue.....dis 85

Chucks.

Cushman's 4 Jaw Independent.....dis 45
" Combination.....dis 40
" Geared Scroll.....dis 30
" 2 Jaw Brass Workers.....dis 30
" Drill.....dis 35
Wescott's Scroll Combination.....dis 33⅓
" Independent.....dis 40
" Little Giant Drill.....dis 30
Horton's Universal.....dis 40
" Independent.....dis 45
Whiton's Independent.....dis 45
National Combination.....dis 40
Sweetland " .....dis 40
Almond Drill.....dis 20
Morse " .....dis 15
Skinner's Combination Lathe.....dis 33⅓
" Independent Lathe.....dis 40
" Universal Lathe.....dis 40
" Drill.....dis 15

Cutters and Reamers.

Cleveland.....dis 10@15
Pratt & Whitney.....dis 10@15
Standard.....dis 10@15
Brown & Sharpe, Milling Cutters.....dis 15
Gear Cutters.....dis 15

Crowbars.

Cast Steel.....₩ lb 4
Iron, steel points.....₩ lb 3½

Drill and Drill Sockets.

Twist drills.....dis 50&10
Morse Taper and Straight shank to 1⅛".....dis 50&10
Morse Taper and Straight shank Larger than 1⅛".....dis 25
Drill Sockets.....dis 25
Standard Twist Drills.....dis 55@55&5
Cleveland " " .....dis 55@55&5

Emery.

	No. 4 to 46 gr.	No. 54 to 150. gr.	Flour, F.	C. F. FF.
Kegs, ₩ lb	4 c	5 c		2½c
½ kegs ₩ lb	4½c	5½c		3 c
¼ kegs ₩ lb	4½c	5½c		3 c
10 lb cans, 10 in case	6 c	6½c		5 c
10 lb cans, less than 10	10 c	10 c		7½c

Emery Cloth and Paper.

Barder, Adamson & Co.....dis 45@50
H. H. Barton.....dis 50@50&10

Emery Wheels.

Detroit.....dis 55@60
Norton's.....dis 55@60
Grant.....dis 55@60
Sterling.....dis 60
Celluloid.....dis 10&33⅓
Northampton.....dis 55
Crystal.....dis 65@70
Vitrified.....dis 60
Vulcanite.....dis 10&10

Files.

Nicholson.....dis 60&10@60&10&10
" X. F.....dis 25
Kearney & Foot.....dis 60&10@60&10&10
Black Diamond.....dis 60&10@60&10&10
Arcade.....dis 60&10@60&10&10
Disston's.....dis 65@70
Western.....dis 70
Stub's.....dis 25
Grobet's.....dis 30
Reynolds Bros.' Hand Cut.....dis 50
ndustry File Works, hand cut.....dis 50

Hammers.

P. S. W.....dis 40
Atha new list, Jan. 15, 1887.....dis 50
Heavy hammers and sledges under 5 lbs. 18c over 5 lbs 14c, new list.

Jack Screws.

Illinois Bolt Co. list.....dis 70

Nuts and Washers.

Size of bolt inches	⅜	5-16	⅜	½	⅝	¾	⅞	1
Square	8	7	5½	4½	4	2½	2½	
Hexagon	15¾	11¾	8½	6	5¼	5½	5	
Washers	9	8	7	5	4½	4½	4½	

In lots less than 100 lbs, ₩ lb add ½c., 1 lb boxes add 1c to list.

Nails (wire.

List July 14, 1887.....dis 70 &10
Standard Penny Nails, ₩ keg card rate
Car lots.....$2.30
Less than car lots$2.40

Oilers.

Zinc and Tin.....dis 60
Brass and Copper.....dis 50
Malleable (Hammer's), No. 1, $3.60; No. 2, $4.00; No. 3, $4.40 ₩ doz.....dis 10@10&10

Packing, Steam.

Boston Belting Co.....dis 60
American Packing Hemp.....₩ lb 10@11
Russia Packing " .....₩ lb 14
Italian Packing " .....₩ lb 13@14
Plumbago Piston.....₩ lb 40
Morrison's " .....₩ lb 50
Square Flax " .....₩ lb 50
Sheet Rubber.....₩ lb 12&24
Excelsior Rubber.....₩ lb 48

Picks.

Railroads, 5 to 6 lbs.....$12 dis 60
" 6 to 7 lbs.....$13 dis 60

Pulleys.

Iron Pulleys, Walker List.....dis 45
Medart Pulleys.....dis 55
Split Wood Pulleys.....dis 50@55

Rivets.

Iron, Thousand, list November 17, ...dis 50
Iron, Ordinary, Cooper's Block and Carriage list November 17.....dis 50
Copper.....dis 50@50&10

Rope.

Manilla, ¼ inch and over.....₩ lb 15¾
Sisal, ¼ inch and over.....₩ lb 13¾

Sand Paper.

B. A. & Co.....dis45@50
H. H. Barton's.....dis40@45
New England Flint.....dis 40@50
Barton's Garnet.....dis 20

Saws.

Disston's Circular.....dis 40@10
" Band.....dis 10
" Scroll.....Net
Hack Saw Stubs.....dis 20
" " Eureka.....dis 20
" " Star.....dis 20
Saw Swages Disston's.....dis 30
Atkins' Cicular Saws.....dis 40&45
" Mill, Mulay and Drag Saws..dis 40&10
" Wood Saws.....dis 40&10
" Silver Steel Diamond Cross-cut Saws.....dis 70c per ft
" Dexter Cross-cuts.....dis 50c "
" Diamond " .....dis 50c "
" Tuttle Tooth Cross-cuts..dis 25c "
" One-man Cross-cuts.....dis 32c "
No. 1 Handles.....dis 23c per pair
No. 6 " .....dis 16c "
Excelsior Saw Tools.....$6 per doz
Perfection " .....$15 "
Detroit Saw Works, Circular.....dis 50
" " " Band.....dis 25
" " " Mulay.....dis 45

Screws.

Wood Screws—New List 1890.

Flat head iron.....dis 72½
Round head iron.....dis 67½
Flat head brass.....dis 72½
Round head brass.....dis 65
Square Cap.....dis 65
Hexagon Cap.....dis 60
Set C. H. C. P.....dis 70
Machine, flat head, iron.....dis 65
Machine, round head, iron.....dis 60
Bench and hand—
Lag or coach.....dis 75@75&10
Coach, patent gimlet point.....dis 75

Shovels and Spades.

Ames' list November 1, 1885.....dis 20
Dennis.....dis 5.25
Hussey & Binns, railroad.....dis 8.00

Taps.

Cards, Hand and Nut to 2 in.....dis 50
Carpenters' " " " .....dis 50
Morse " " " .....dis 50
Pratt & Whitney " " new list dis 10
Machine Screw Taps.....dis 55
Pipe Taps to 2½ in.....dis 70
Stay Bolt Taps.....dis 25
Stove Bolt Taps.....dis 50
Pulley Taps.....dis 40

Twine.

	BC.	B.
No. 12, Flax Twine, ¼ and ½ lb Balls	21c@29c	
No. 18 " " ¼ and ½ "	18c@26c	
No. 36 " " ¼ and ½ "	16c@27c	
2-Ply Hemp, ¼ & ½ lb Balls (Spring Twine	11½c	
3-Ply " 1 lb Balls	12@12½c	
3-Ply " 1½ lb Balls	11@11½c	
Cotton Wrapping, 5 Balls to lb	15@16c	

Vises.

Solid Box.....dis 60
Parker's.....dis 20@25
Prentiss.....dis 20
Stephen's.....dis 25@30
Barrett's.....dis 30
Miller's Falls.....dis 40
Merrill's.....dis 15@20
Howard.....dis 35

Wire.

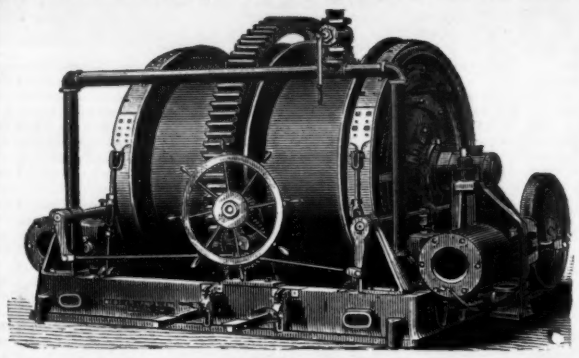
New List, Jan. 18, 1884

Brass and copper.....dis 20@25
Bright and annealed, Nos. 0@18...dis 70&10@75
" " Nos. 19@26..dis 75@75& 5
" " Nos. 27@36..dis 75&10& 5
Coppered Nos. 0 to 18, market list..dis 70@70& 5
Galvanized Nos. 0 to 18 " "....dis 65&5
Tinned market Nos. 0 to 18.....dis 67½
Cast steel.....dis 50
Tinned Broom Wire.....dis 70&5@70&10
Annealed Fence, Nos. 8 and 9.....dis 75
Annealed Grape, Nos. 10 to 14.....dis 75
Stub's Steel Wire regular.....$6.00@lb dis 5

Wrenches.

Coe's genuine, ...dis 50
Girard Standard.....dis 70&10
Agricultural.....dis 75&10
Mechanics'.....dis 55&10,& 5
Bemis & Call's Combination .....dis 35
Donohue's Engineers.....dis 20&10
Lamson & Sessions Engineers.....dis 60
Billings & Spencer's Drop Forged.....dis 25
William's " " .....dis 25
Alligator " " .....dis 50

Webster, Camp & Lane Machine Co.



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Mining Machinery,

Improved Band Friction Hoisting Machinery, Geared or Direct Acting, for round or flat rope.

Wire Rope Haulage Machinery,

Endless or Tail Rope Systems.)

CORNISH PLUNGER AND BUCKET LIFT PUMPS.

Automatic or Slide Valve Steam Engines, Sheaves, Cages, Buckets, Etc.

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ESTABLISHED 1828.

Oldest and Largest Manufacturers In the world.

VULCANIZED RUBBER GOODS

For Mechanical purposes.

256-260 DEVONSHIRE STREET, BOSTON.

100 Chambers St., New York.
161 to 165 W. Pearl St., Cincinnati, Ohio.
148 to 150 Water St., Cleveland, Ohio
109 Madison St., Chicago, Ill.

THE THOS. D. WEST FOUNDRY CO.

CLEVELAND, O.

LIGHT AND HEAVY

IRON CASTINGS.

DAILY MELTING CAPACITY 75 TONS—SPECIAL FACILITIES FOR ECONOMICALY TURNING OUT SMOOTH CLEAN CASTINGS.

DUPLICATE WORK A SPECIALTY.

F. A. SACKMANN,

125 Champlain, Cleve nd

Steel Name Stamps (1-16, 3-32 or ¼ inch letters, 15c. per letter

SECTION OF CONVEYOR.

Detachable Roller and Chain Belting.

CHAIN.

MADE IN ALL SIZES OF

Malleable Iron and Steel,

DESIGNED FOR

Elevators, Conveyors, Drive Belts, etc.

For handling materials of all kinds.

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Chicago Office, 48 S. Canal St.

Eastlake Metallic Shingles.

Unequaled for ROOFING AND SIDING.

Manufactured by W. J. BURTON & CO.'s Galvanized Iron Cornice Works, Detroit, Mich.

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CAN BE USED ON ANY SCREW-CUTTING LATHE FOR

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Or any one having use for SMALL GEARING.

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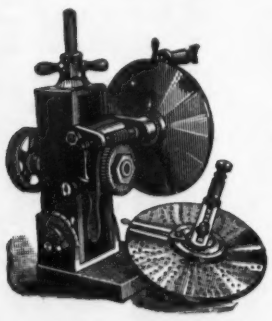

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HEAVY AND LIGHT CASTINGS.

Privilege to make estimates solicited.

UNION ELECTROTYPE FOUNDRY

TELEPHONE 2139

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THE BRIGHTMAN STOKER IS THE BEST
STEAM BOILER FURNACE IN THE WORLD.
SEND FOR DESCRIPTIVE PAMPHLET. THE BRIGHTMAN STOKER CO. 201-203 RIVER ST. CLEVELAND, OHIO.

HARDWARE MARKET.

Augers and Bits.

Common augers and bits.....dis 70
Snell's.....dis 60&5
Cook's Douglass Mfg. Co.....dis 55
Russell Jennings' augers and bits.....dis 25
Expansive Bits, Clark's small, $18; large, $26.....dis 35@35&5
Hollow Augers, Ives'.....dis 25&10
Hollow Augers, Bonney's Adjust. ℔ doz., $48.....dis 40&10
Hollow Augers, Stearns' Adjust. ℔ doz., $48.....dis 20&10
Gimlet bits, common.....per gross $3 25@4 00
Standard Bit Stock Drills.....dis 50&10&5
Ship Augers.....dis 15&10@15&10&5

Axes.

Makers' and Special Brands—
First quality.....℔ dos $7 00
Others.....℔ dos $6 00
Full polished.....℔ dos $8 00

Bolts.

Cast iron barrel bolts.....dis 70
Cast iron shutter bolts, etc.....dis 70
Cast iron chain bolts.....dis 65&10
Ives' patent door bolt.....dis 60
Wrought iron barrel bolts.....dis 70
Wrought iron square bolts.....dis 70
Wrought shutter bolts.....dis 60&10
Sargent's list
Carriage, common, new list.....dis 75&10
Tire, common, new list.....dis 65
Carriage and tire, Philadelphia pattern.....dis 75&10
Stove bolts.....dis 60
Plow bolts.....dis 60&5
Machine.....dis 75&10@80
Ends.....dis 75&10&80

Buckets, Elevator.

.....dis 50&10

Butts.

Wrought brass.....dis 75&10
Cast brass, loose joint.....dis 33⅓
Cast Iron—
Fast joint, narrow.....dis 50&10&5@60
Fast joint, broad.....dis 50&10@60
Loose joint.....dis 70&10
Loose joint, jap.....dis 70&10
Loose joint, jap. with acorns.....dis 70&10
Loose pin, acorns.....dis 70&10
Loose pin, japanned acorns.....dis 70&10
Loose pin, acorns, jap. plated tips.....dis 70&10
Wrought steel—
Wrought, fast joint, narrow.....dis 70&10
Wrought, fast joint, broad.....dis 70&10
Wrought, loose joint, broad.....dis 70&10
Table Butts, back flaps, etc.....dis 70&10
Regular inside blind.....dis 70&10
Light inside blind.....dis 70&10
Loose pin.....dis 70&10
Light loose pin.....dis 70&10

Carbonized Felt and Building Papers.

(POWERVILLE BRAND.)

	Per roll of 500 sq. feet.
Eberts Bros., Detroit.	
No. 1—Slaters'.....	$1.25
"A," Stringed Roofing, Light.....	1.50
"B," Stringed Roofing, Medium.....	1.75
"C," Stringed Roofing, Heavy.....	2.00
Stringed, Rosin-Sized.....	1.00

MILCELLANEOUS.

Asphaltum, Trinidad Refined, ℔ ton.....	$30.00
Asphaltum, Fine Grade, ℔.....	.08
Coal Tar Felt, 1 Ply, ℔.....	.02
Coal Tar Felt, 2 Ply, ℔ roll 108 sq ft.....	1.42½
Coal Tar Felt, 3 Ply, ℔ roll 108 sq ft.....	1.85
Roofing Pitch, ℔ gal.....	.09

Chains.

Revised List.
Trace, 6⅛-10-2.....℔ pair 1.03
Trace, 6⅛-10-3.....℔ pair .92 .....50&10
Trace, 7-10-2.....℔ pair 1.11
German Halter Chain, list June, 1887...dis 50&10
German Coil, list of June, 1887.....dis 50&10@60
Galvanized Pump Chain.....℔ 5¾@6
Jack Chain, Iron.....dis 75&10
Jack Chain, Brass.....dis 75

Chisels.

Socket Framing and Firmer.....dis 75
Socket Framing and Firmer, Buck Bros..dis 30
Socket Firmer and Framing, L. & I. J. White.....dis 30@30&5
Tanged Firmers.....dis 40&10

Cutlery.

Table.....net
Excelsior Pocket.....net

Fibre Ware—Standard.

	Nos. 1	5.	5X.
Pails, water, 12 qt.....	$4 00	$4 50	$.....
Dairy, 14 qt.....	4 50	5 00	.....
Fire 12 qt.....	5 00	....	.....
Sugar.....	6 00	6 50	.....
Horse.....	.....	5 00	.....
Buggy.....	4 00	.....	.....
Chamber Slop Commode } 5 and 5X 14 qt.....	6 50	7 50	8 50
Spittoons, slop, 5 and 5X 14 qt.....	8 00	9 00	10 00
Basins, wash—			
10½ inch.....	2 00	2 25	.....
12 inch.....	2 25	2 75	3 25
13½ inch.....	2 75	3 25	3 75
15 inch.....	3 25	3 75	4 25
Bowls, fruit.....	.....	2 50	.....
Servers, 12 in.....	.....	2 25	.....
Baskets, waste paper, 13 in.....	.....	6 00	.....
Spittons, "Daisy," pressed			
8 inch.....	4 00	4 50	5 00
10 and 11¾ inch.....	6 00	6 50	7 50

No. 1 plain; No. 5 decorated; No. 5X White decorated.

Gimlets.

Nail and Spike.....dis 50&10&5
Double cut, low list.....dis 25
"Bee".....℔ gross $12, dis 25@25&5

Hanger

Barn door, old patterns.....dis 60&10&10@70
Climax, (Anti-Friction).....dis 55
Scranton.....dis 33⅓
Kidder's.....dis 50&10@60
Terry's Patent.....5 in., $12; 4 in., $10, dis 50&5
Paragon.....dis 40&10
Richard's.....dis 30@30&10

Horse Nails.

	No. 10	9	8	7	6	
Ausable, ℔ M.	23	24	25	26	28	dis 40
Putnam, ℔ M.	18	19	20	21	23	dis 15
Essex						dis 25&10

Horse Shoes.

Burden, at factory.....℔ keg $4 00
R. I. Horshoe Co., Perkins' Imp. at factory.....℔ keg $4 00
Mule Shoes, at factory.....℔ keg $5 00

Knobs.

Carriage, japanned.....℔ gross 80c dis 60&10
Base, rubber tip.....dis 70&10&5
Hematite door knobs, new list.....dis 40&10@50
Door mineral.....dis 65c@68c
Door Por. japanned.....dis 75c@78c
Door Por. nickle.....$2 00@2 25
Door Por. plated.....$2 00@2 25

Locks, Bolts, Etc.

P. & F. Corbin, Locks and Bronze Goods.
Door locks, knobs and latches.....dis 60&10
Escutcheons and keys.....dis 60&10
Padlocks and padlock keys.....dis 75
Bell pulls, mineral, porcelain and jet dis 60&10
Bell pulls, genuine bronze.....dis 60&10
Lever bell pulls, genuine bronze.....dis 60&10
Butts', genuine bronze.....dis 60&10
Butts' bronze plated.....dis 60&10
Store door locks and latches.....dis 60&10
Store door handles.....dis 60&10
Shutter hinges & flaps, genuine bronze.dis 60&10
Shutter hinges, bronze plated.....dis 70
Flush bolts, genuine bronze.....dis 70
Shutter knobs, genuine bronze.....dis 50
Shutter bars, genuine bronze.....dis 60
Sash lifts, genuine bronze.....dis 60
Sash pulls and plates, genuine bronze.....dis 60
Push plates, genuine bronze.....dis 60
Drawer pull, genuine bronze.....dis 70
Letter box plates, genuine bronze...dis 60&10
Barn door locks.....dis 33⅓
Bishop's Buckeye Sash Locks.....℔ gross $4.80

Plumbs and Levels.

Standard list.....dis 70&10
Pocket levels.....dis 70&10
Davis' inclinometers.....dis 10&10

Pumps.

Cistern, best makers.....dis 50&10@60
Pitcher spout, best makers dis 60&10@60&10&10
Pitcher spout, cheaper goods.....dis 70@70&5

Pokes, Animal.

Bishop's I. X. L.....℔ dos $6 00
Bishop's O K.....℔ dos $5 25
Bishop's Pioneer.....℔ dos $3 75
Bishop's American.....℔ dos $2 75

Rakes.

Cast steel.....dis 70
Malleable.....dis 70@70&5

Razors.

J. R. Torrey Razor Co.....dis 20
Wostenholme & Butcher.....$10@$...dis 10
Rifle razor.....dis $9 50 net

Rat Killers.

Schuyler's.....℔ gross $15 00

Scales.

Hatch, Counter, No. 171.....℔ dos $21 00
Hatch, Tea, No. 161.....℔ dos $6 75@7 00
Chatillon's Grocers.....dis 50
Family Turnbulls.....dis 30@30&10
Scale Beams, List of January 12, 1882.....dis 50&10@50&10&4

Screw Drivers.

Stanley R. & L. Co.'s Varnished Handles.....dis 65&10
Stanley R. & L. Co.'s Black Handles..dis 60&10
Sets interchangeables.....℔ dos $18 dis 25

Squares.

Steel and iron, Nickel plated.....dis 75&10@80
Disston's try square and T bevels.....dis 45&10
Winterbottom's try and miter.....dis ... &10

Tacks, Brads, Etc.

New List, Oct. 19, 1890.
American iron carpet tacks all kinds dis 77½&10
Steel carpet tacks all kinds.....dis 75&10
Swedes iron carpet tacks, all kinds dis 75&10
Swedes iron tacks.....dis 75&10
Swedes iron Upholsterers' tacks.....dis 75&10
Tinned Swedes iron tacks.....dis 77½&10
Tinned Swedes iron Upholsterers' tacks.....dis 77½&10
American iron cut tacks.....dis 77½&10
Copper tacks.....dis 40&10
Copper finishing and trunk nails.....dis 50&10
Cigar box nails.....dis 50&10
Finishing nails.....dis 60&10
Hungarian nails and miners' tacks..dis 60&10
Gimp and lace tacks.....dis 77½&10
" " " tinned.....dis 60&10
Trunk and clout nails.....dis 72½&10
Tinned trunk&clout nails.....dis 66&10
Basket nails.....dis 66&10
Chair nails.....dis 66&10
Common and patent brads.....dis 66&10

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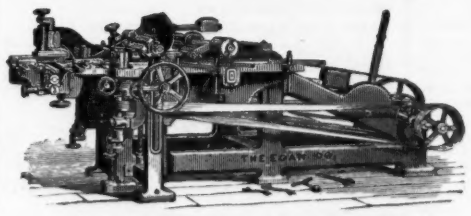

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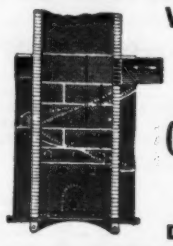

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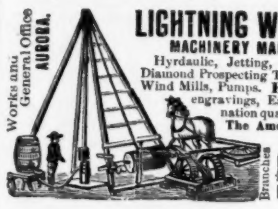

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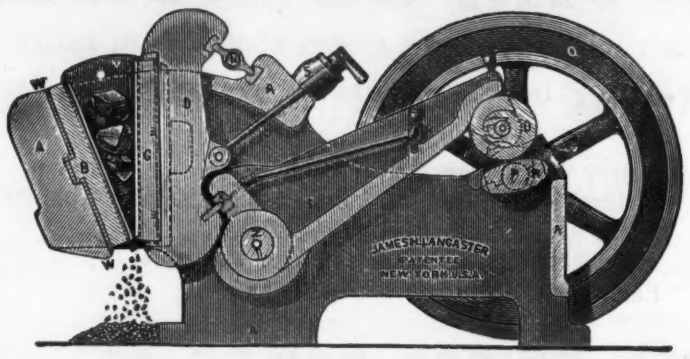

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(Standard Gauge.)

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Canton—6:50 a. m., 3:00 p. m., 6:20 p. m.
Kent—6:50 a. m., 3:00 p. m., *5:45 p. m. 6:20 p. m.
Bedford—6:50 a. m., 11:10 a. m., 1:30 p. m., 3:00 p. m., 4:40 p. m., *5:45 p. m., 6:20 p. m. 10:35 p. m.
Newburgh—6:15 a. m., 6:50 a. m., 11:10 a. m., 1.30 p. m., 3:00 p. m., 4:40 p. m., *5:45 p. m., 6:20 p. m., 10:35 p. m.

Arrive from—

Zanesville and Coshocton—10:30 a. m.,6:30 p m.
Canton, 10:30 a. m., 2:35 p. m., 6:30 p. m.
Kent—*8:10 a. m., 10:30 a. m., 2:35 p. m., 6:30 p.m.
Bedford—6:00 a. m., *8:10 a.m., 10:30 a.m., 1:05 p. m., 2:35 p. m., 4:15 p. m., 6:30 p.m., 7:10 p.m.
Newburgh—6:00 a. m., 7:15 a. m., *8:10 a. m., 10:30 a. m., 1.05 p. m., 2:35 p. m., 4:15 p. m., 6:30 p. m., 7:10 p. m.
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Wheeling and Bellaire.	7 45 a m	12 50 p m
	1 15 p m	6 35 p m
	*11 10 p m	.....
Alliance Accom.....	3 25 p m	10 10 a m
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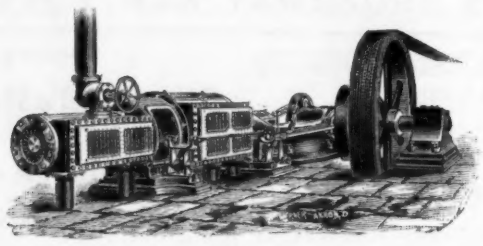

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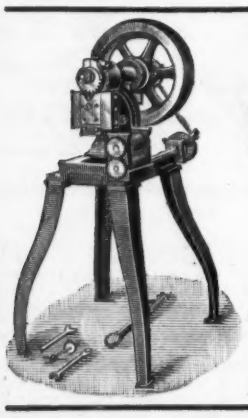

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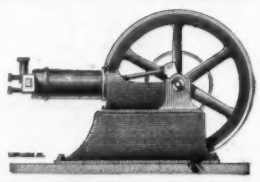

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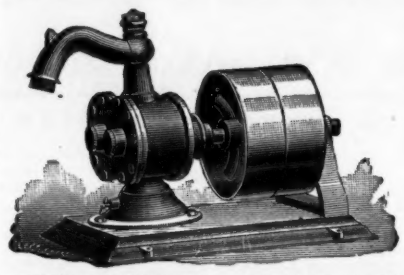

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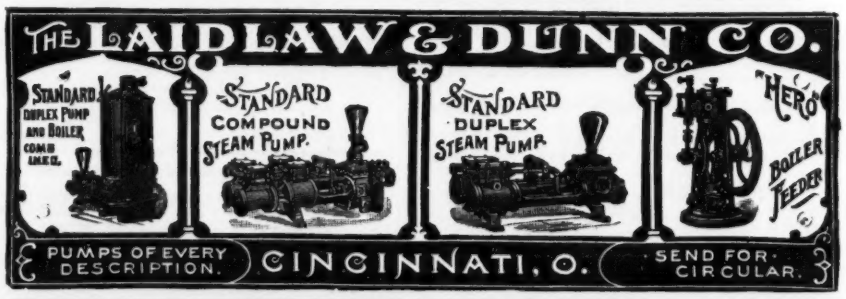

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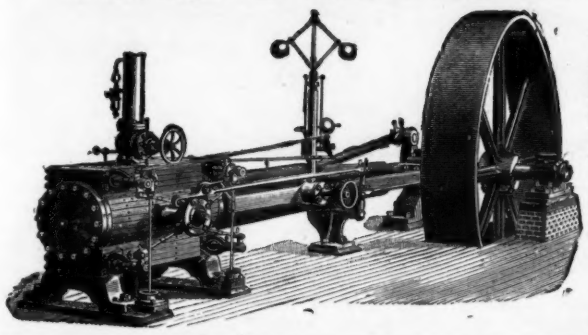

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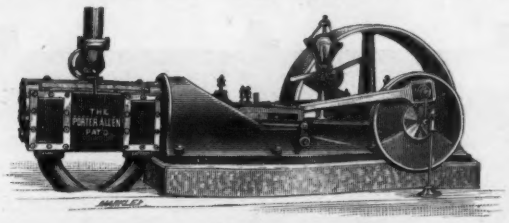

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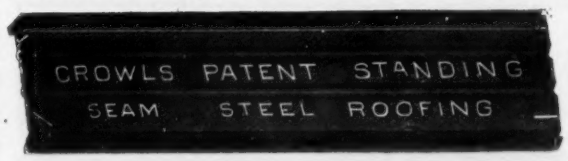

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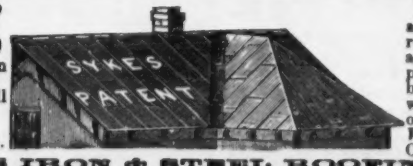

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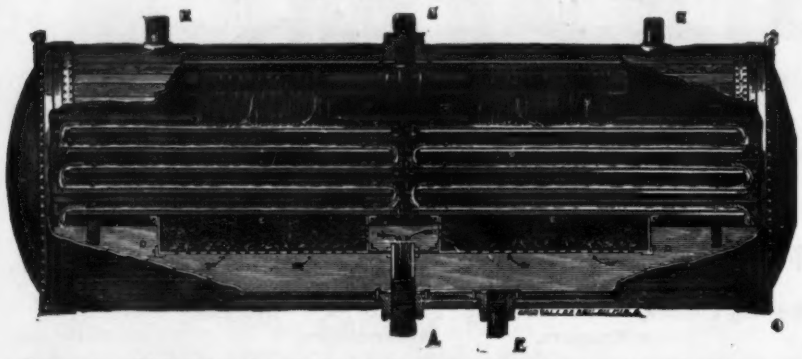

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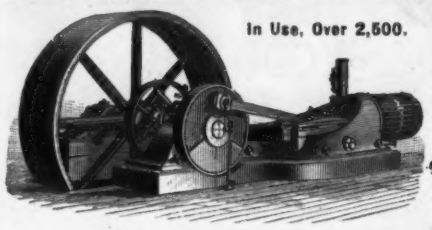

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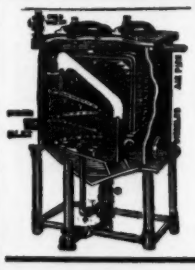

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